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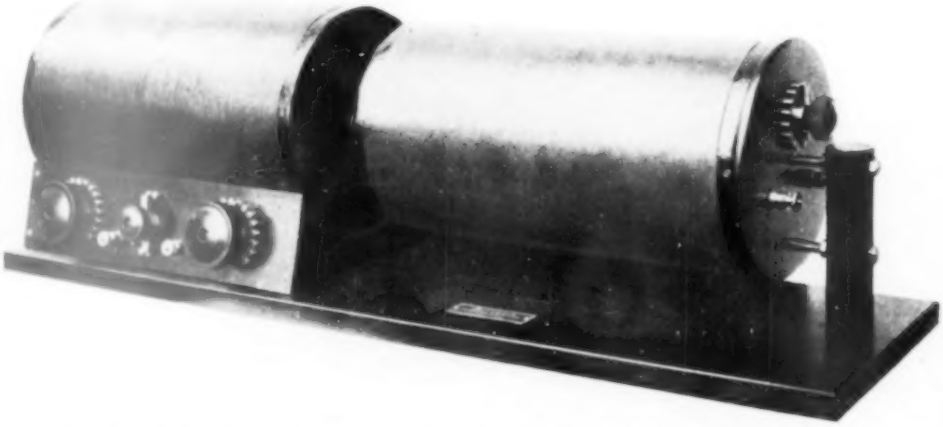

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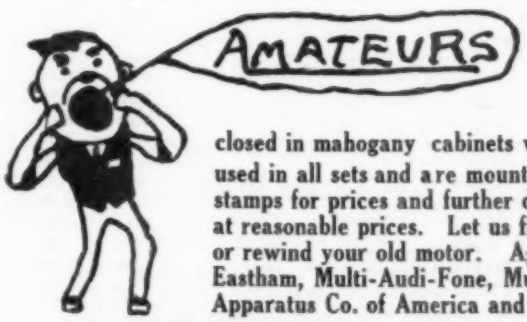

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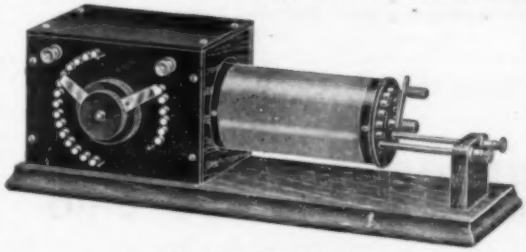

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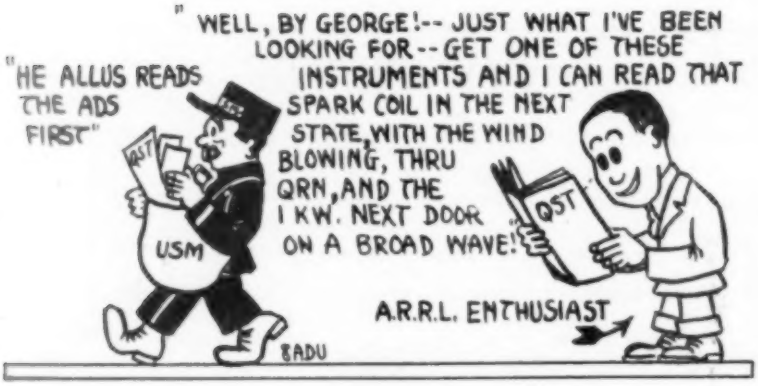
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QST
A MAGAZINE DEVOTED EXCLUSIVELY TO THE AMATEUR

The Measurement of High Frequency Currents

By Chas. S. Ballantine
The Radio Research Laboratories, Philadelphia, Pa.

In this paper Mr. Ballantine has carefully figured out the errors and corrections which should be made in connection with a hot-wire ammeter. The subject of measuring antenna currents is a very important one. In the original paper Mr. Ballantine gave the mathematics in detail. With much regret we have left the mathematics out as the majority of readers assume an injured air if they discover any mathematics higher than arithmetic. Do we all feel this way?—Editor.

ONE of the most important measurements in the field of radio engineering is that of current. A knowledge of this factor is essential in certain calculations involving related factors such as power and signalling range and therefore becomes of fundamental importance. It is regrettable that the refinement of the modern methods of measuring low frequency and direct currents has not been extended to include those of higher frequencies used in wireless work. Here and there are found records of remarkable investigation in this field but for the most part these descriptions have been confined to scientific journals and the semi-technical press has published very little material of this sort. In view of this fact and of the importance of the subject from the amateur's standpoint it is thought that a few remarks on the subject might be of interest.

It is well known that the majority of hot-wire ammeters used in high frequency circuits are subject to error when their calibration has been made on direct current and transferred to high frequency. This is particularly the case when the active wire is shunted to extend the range. In single wire instruments the errors cannot be said to have been eliminated unless the cross section of the wire is small enough to confine the current to the same section at all frequencies. A heating element of No. 40 is practically free from such error but it is evident that the field of usefulness of such a meter is not very extended. The upper limit in current range of single wire meters is about one or two amperes. Of course the diameter of the wire may be increased within judicious limits and even in excess of these limits if the change of resistance with frequency is determined mathematically from the Kelvin formulae, but even then the meter becomes very sluggish and no particular advantage seems to have been gained. A better method perhaps is to increase the number of wires in parallel to the active element and determine the error mathematically and after direct current calibration to correct the scale for this error. For the benefit of those who do not wish to make the necessary analysis of the problem, the following paragraphs are included.

The errors occuring in the parallel wire type of ammeter are mainly of two kinds. The first is due to the skin effect in the individual wires while the second is due to the unequal distribution of current across the system which might be termed over all skin effect. As the first of these errors is present in the single wire meter as well as that of a larger number of wires, it will be useful to determine quantitatively its value under different conditions so that a judicious selection of active element may be made.

The fact that high frequency alternating currents tend to confine themselves to the outer surface of a conductor has been known for some time and has attracted the attention of eminent mathematicians to the solution of the problem of determining the results of this phenomena. Probably the most useful solution is that published by Lord Kelvin in Mathematical and Physical Papers, III, 1889, and most of our present day calculations are based on his formulae. Within the past few years the problem has been very ably treated by Northrup and Carson in the Journal of the Franklin Institute Vol. 77 No. 2, 1914, which also gives a method of determining the error in the present case.

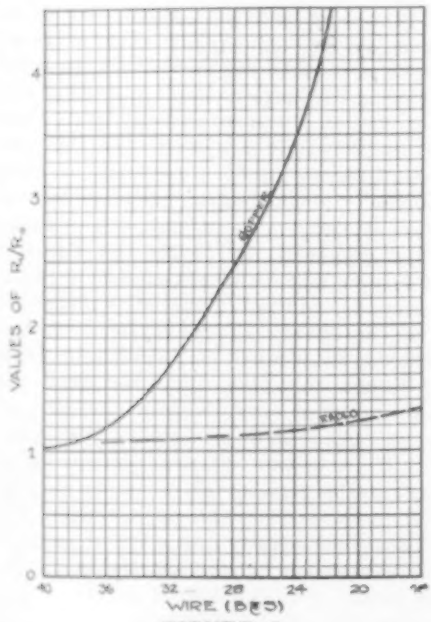


FIGURE 1

The writer has calculated the change of resistance with diameter of conductor at a frequency of 900,000 cycles corresponding to a wave length of 333 meters. The results of this calculation are shown graphically in Figure 1.

It will be evident from a study of this curve that the error due to distribution will be appreciable when larger wires than No. 40 are used. The curve marked Radlo in the figure shows the effect of frequency on a conductor drawn from special alloy known under the trade name of Radlo which has a specific resistance 30 times that of copper. Substituting this new conductivity in Kelvin formula the results to be expected may be calculated and are seen to be very much reduced. In other words it is advantageous to employ a high resistance alloy for the heating element on account of the smaller effect of frequency upon it. There are also other considerations in selecting the material for the active element of an ammeter, which favor the use of these high resistance alloys. The fundamental requirement of an alloy to give a nearly uniform scale is a low temperature coefficient. This characteristic is found in several of the resistance alloys. The use of Therlo has been recommended at various times on account of its low resistance change and is probably very satisfactory. The writer has developed a special alloy at the Radio Research Laboratories in Philadelphia which is even more desirable than Therlo, having a lower temperature coefficient of .0000024 F. and a high specific resistance, 300 Ohms per mil foot. This alloy is known under the trade name of "Radlo" and is composed of copper and nickel in such proportions as to produce the desired characteristics. It is suggested that the heating element be of some material similar to this for the reasons just pointed out.

A meter composed of a single conductor of No. 36 Radlo may be said to be free from error at all frequencies employed in radio work but as has been previously remarked the range of such an instrument is extremely small. An increased range may be obtained by placing a number of such wires in parallel. This instrument

may be calibrated on direct current and after suitable correction has been made may be used on the higher frequencies.

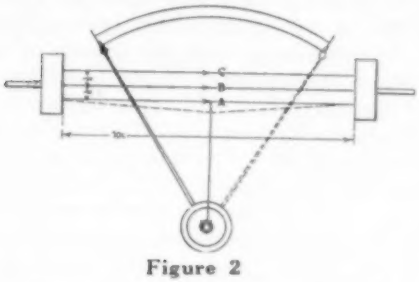


Figure 2

In order to determine the magnitude of this error it will be necessary to consider the problem analytically. To establish a foundation upon which the reader may work and extend the results of the method to other types we may consider an ammeter composed of three parallel wires as shown in Figure 2 and thus obtain a general solution of the problem. The three wires shown above are arranged so that the expansion of one of them measures the current. The range of the instrument is about 6 amperes using copper wire. This assumption is made to enable the simplification of the problem and later a comparison will be made with three Radio wires in parallel.

It is assumed that the three conductors A, B and C are of equal cross section, resistance and length. The error due to the crowding of the current to the outer wires may be determined.

The inductance of each wire may be calculated from the well known expression for the self inductance of linear conductors given in the Bull. Bureau of Standards, Vol. 8, No. 1 page 150.

The problem at hand is to determine the increment of current in the wires A and C and the decrease in B. A ratio may be obtained from which it is possible to calculate the actual current thru A in relation to that carried at low frequencies or direct current. The problem is analagous to that of determining the distribution of current in a multiple wire antenna.

By means of equations it is possible to determine the actual error occuring at any frequency. In order to illustrate the use of these formulae let us consider the errors in the system in Figure 2. For this system we have the ratio of direct current to high frequency as 1.045. This means direct current reads 1.045 times higher than the high frequency.

The value of this ratio may be calculated for various values of frequency and an idea of the effect of frequency on the current distribution may be obtained. In Table I the results of such calculation have been tabulated. It will be seen that at a wave length of 200 meters using the

Table I

Wave Length	Ratio	Per Cent.
100 M.	1.046	4.60
200	1.038	3.80
300	1.032	3.18
600	1.018	1.83
1000	1.009	.88
2000	1.003	.25

heat generated by the current in A the error in the reading would be 45 per cent. These figures point out very forcibly the fallacy of the assumption very often made that the d. c. calibration necessarily holds

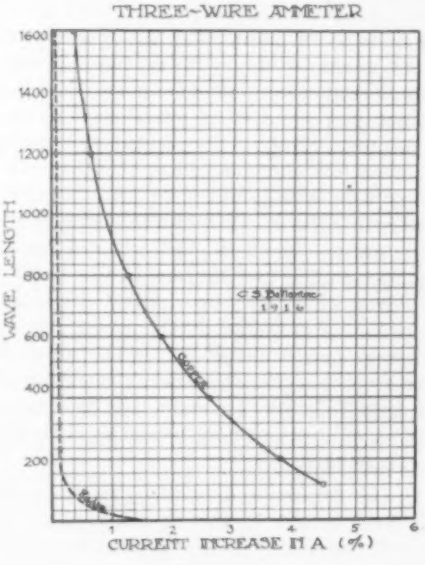


Figure 3

at the higher frequencies. In the above system the calibration values on d. c.

must be divided by 1.045 to obtain the correction for 200 meters. The fact that this correction value undergoes a change as the wave length is varied is also evident and it is often very inconvenient to have to refer to curves to determine the reading of an ammeter, so means of keeping this correction constant would be of great use in practical work. Referring to Figure 3 the dashed curve shows the change of distribution with conductors of Radlo wire and a comparison with the curve for copper will suggest a method of reducing this correction as well as keeping it almost constant. It will be seen that the errors in the case of the Radlo wires are moved up to frequencies higher than those used in wireless work permitting the direct current calibration to be used at all radio frequencies with very small error. This method of reducing the error in ammeter work is certainly to be recommended and is preferable to some of the methods of shunting the active element now used in so many commercial instruments. By inspection of equation (9) another method is suggested. If the mutual inductances the system are balanced it is obvious that there will be no change in distribution with increased frequency. This is accomplished by arranging the conductors in the form of a cylinder the current leads being taken off the ends. In this manner any number of wires may be employed until finally with an infinite number of conductors the equivalent of a tube with a very thin wall is obtained which is practically free from distribution change. The only error which is liable to occur is that due to the distribution in the individual wires which may be totally eliminated by reducing the size of the wires and increasing their number. This last arrangement in the cylindrical form seems to be the best that can be made and the direct current calibration may be assumed to hold for all frequencies.

In the foregoing discussion no reference has been made to the mechanical details of the methods of measuring the heat production in A. This subject has very little technical interest and so many methods of indicating the heat have been suggested that a repetition would be a waste of space. However, the writer would like to suggest a method of measuring the heat that has received very little attention by ammeter manufacturers and consequently is very little known in amateur circles. This method is not original but was suggested by Fleming some time ago in one of the foreign publications. The advantage of its use has never seemed to appeal very strongly to the amateur. This is probably due to scarcity of experimental evidence proving its adaptibility to this kind of measurement. For this reason the following paragraphs should be of interest.

Figure 4 shows the system of Figure 1 with the expansion apparatus replaced

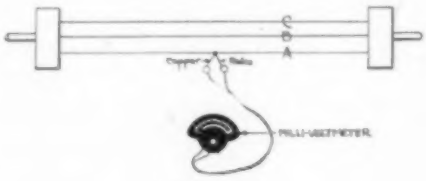


Figure 4

by the thermo-junction Cu-Ra. The action of the device is as follows. The current thru A heats the thermo couple composed of a copper and Radlo wire and generates a thermal E.M.F. proportional to the square of the current. This E.M.F. is indicated on the milli-voltmeter connected across the thermo-element and the calibration of the meter may be made in terms of R.M.S. amperes in A or in the whole system. The use of a thermo-junction and milli-voltmeter as above outlined is very convenient and reliable if the junction is properly constructed and is to be recommended to the crude expansion methods of the common commercial instrument. The voltmeter may be mounted at a distance from the thermo element which is sometimes desirable when the indicating instruments are to be mounted on one board situated some distance from the high frequency circuits.

To those desiring to construct such an ammeter the following data may be of interest. The potential in the thermo-junction circuit of a copper-Radlo couple with one ampere in the heating wire is about 10 milli-volts. This of course varies, but the above figures may be used to determine the range of the voltmeter to be used.

Perhaps a better method of utilizing the heat production in the system would be to connect a junction to each wire and use the total heat production in the system. This would eliminate the errors of distribution so that the instrument could be calibrated directly on direct current. Care should be taken, however, to connect the elements so that there are no opposing E. M. F. S. in the circuit. The range of the milli-voltmeter would have to be increased three times, but this would not be a disadvantage as it would allow a more rugged construction in the meter. An ideal combination within the reach of every amateur is a three wire system of Radlo wire arranged in cylindrical form and three thermo-junctions arranged in series connected to a Weston Model 280 milli-voltmeter range 0-50 milli-volts. This system would be absolutely free from all errors and possess the necessary ruggedness for practical work.

In order to test the validity of the above method of quantitatively determining the errors in the various systems the author has attempted the following experimental results obtained in the preceeding section. A three wire system similar to that shown in Figure 2 was constructed and compared to a standard instrument at 1,-500,000 cycles. The standard consisted of a single wire of cross section small enough to warrant the assumption that the readings did not change appreciably within the entire range of frequency. The arrangement of apparatus is shown in Figure 5. Here I is an exciting circuit coupled to the artificial antenna circuit II which contains the ammeters connected in series. The readings of the two meters were compared within the range of the standard and the results are shown in Figure 6. In this figure the experimental D. C. calibration and the theoretical calculated calibration is shown. The agreement is close and is all that can be expected with the variations of current from moment to moment occassioned by the heating of the gap. The discrepancy between the readings as pointed out by Dellinger is due to the fact that wire A carrying more current than B will be at a higher temperature than B and this difference will be partially neutralized by radiation and convection of heat from A. This will reduce the temperature of A and reduce the reading. Of course the effect may be reduced by further separation of the wires. The wave length used was not far from 200 meters so that the errors shown in the figure are at their maximum. The uniformity of the calibration curve of the Radlo wire is interesting and is characteristic of the low temperature coefficient of the alloy. Except for a small region near the zero, the curve is almost linear.

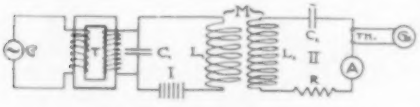


Figure 5

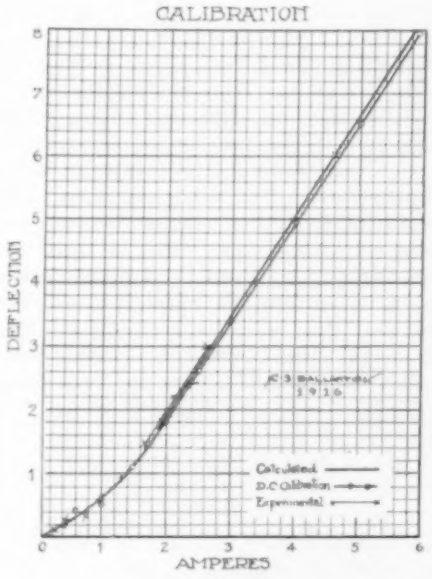


Figure 6

Rotten QRM

By "The Old Man."

Say, fellows, here's the old man again This time he's all excited and boiling over. In fact he's so wild about some "Rotten" subject that he has fallen back to some queer dialect and shouts about "wouff hong's", "rettysnitches", and some disorder known to the trade as "ugerumf". What do all these mean? Better read the article and see. —Editor.

THIS QRM business is getting my Nanny. Here it is midnight, and this msg. from the fellow whose girl has not had a letter from him for a full twenty-four hours, is still stalled. I have smoked myself into a state of funk, the floor is covered with burnt matches, I am losing a perfectly good temper, and there is no sign that this will not continue all night long. How long do these radio bugs sit up at night any way? Right now, as I write, there is that old gink 2AGJ up in York State

Smoked himself into a state of funk.

fluttering along with that bird-in-the-cage-spark of his, 8YO is yelling his darned head off for somebody over on the Pacific Coast, apparently, 8NH is still trying her best to be ladylike in spite of a full hour of trouble, old 8AEZ is booming out QSA but QRM bad CUL, 9PC is trying to do something to 5BV, I distinctly heard 4DI say a bad word, and to the best of my knowledge and belief, no one has got anywhere.

What are we going to do about this business? It used to be that we were perfectly satisfied to listen to SLI and once in a while on Saturday night when we could stay up that late, we would listen to Arlington send time. When we heard some commercial say QRM, we had to look it up on the chart to see what it meant. Later, we began talking to the fellow over on the other side of town and then was born our amateur QRM. Sometimes, the "little boy with the spark coil," (the latter is all right, but dog gone the hide of the former) would try to call us at the same time, and we used to think we were in trouble. Still later we used to think we were bothered when we were in the middle of a "conversation" with a fellow in the next town, and some whop would butt in. It was about this era that we began to organize Radio Clubs, with high faluting ambitions about "promoting radio communication and controlling interference."

But, when we have a fellow who has not written to his girl for a full twenty-four hours, and who positively must get the msg. to her over in Illinois, it becomes a serious matter to have some one else getting gay with the ether, especially when the latter has no conception of the existence of the word "brevity." One thing I will say, and that is that good old 8AEZ is brief. His spark may drown out everybody in the western hemisphere when he sends, but he is brief. He says what he has to say in a few words in a few signals and he stops. He also does not go in for long technical discussions about gap speed and condenser construction while forty or fifty others of us are waiting with five or six messages each, many of which have been stuck on the pin a week. Far be it

from even me, a real blown-in-the-bottle radio grouch, to find any fault or mention any names, but some of the young gentlemen who burn up valuable time every night and thereby multiply this QRM business, ought to look up in the dictionary the definition of that particular combination of letters indicated by B-R-I-E-F. I could call off a dozen of them right now, and I would if I thought that Editor down east would print them.

The trouble is, the young squirts don't stop to think. They start out and call somebody somewhere every three minutes.

Poor girl in Ill. who hasn't heard from her fellow in 24 hours.

Everybody they hear, they immediately call. If they can't hear anybody, they send a QST something like this:—QST QST QST QST QST QST QST de 1NUT 1NUT 1NUT 1NUT 1NUT 1NUT 1NUT 1NUT. Any station more than fifty miles distant hearing these sigs. please send postal to Willie le Nut, Nutville. Willie repeats each word of this msg. three times. Each letter is sent so slowly it puts you to sleep. He uses up just exactly twelve valuable minutes sending out this hogwash, and drives an old timer to the point where he radiates brush discharge from every hair on his head. These fellows ought to be limited to hours between supper time and 8:30, and any one of them slopping over ought to get a letter from every respectable amateur within his range threatening to spank him if he ever transgresses again. I know a certain some one who will put in his bid for election to the office of Chairman of the Committee on Chastisement.

Here is a sample coming in right now. Listen to this slop:—columbus co 2pp 18co all sigs charles 9vy u no hf a motor little heavier than the racine sorry sorry om qrm qrm pse qta qta k fish smell rotten yes yes wyd boston how do you get me gap bum bum rubber band qta pwf about motors. (Bad squeaks here. Sick spark coil near at hand. Wheezes terribly.) Want to hear tone like commercial? ark r r r yes ark r r r listen nw.

Here begins ten minutes of the darndest scratching, screeching, groaning, blowing off steam, blubbering that ever mortal ear heard. At its worst it goes on into — — fine fine how do u do it? ark r r r rubber band on vibrator—BANG. My friend with the one k. w. over on the other side of town explodes. He calls an 8 station. When he finishes, the scratching reduces. Then we get the long distance QRM again. cul om sk spfscity bunk allemo bish mela hash breakfast wunkey wunkey lala lala 2asj qrm bad qsl 3zw must go to bed now hw hw hw abt abt abt msg msg msg pse pse pse k k k. This is the way my log book this evening looks. It's enough to raise a blister on a wooden leg.

Here is another sample of qrm slush:—v v v v v v v v v v v———————— (Somebody sitting on his key.) v v v v v v v v v v linneg se with the wlce sore feet commercial wirlih. Now what in Heaven's name would you make out this? Is it to the effect that somebody has a line on a commecial who is on the warpath for some amateur with sore feet? One cannot be sure of these matters. It might be that it is the commercial who has the sore feet, chasing some poor amateur around town probably.

Listen to this:—Yes yes jst wyd glucky wait a mt muddy wouff hong bliftsfy monkey motor. We assume from this msg that Glucky is being asked to wait a minute while Blifsky seeks a wouff hong with which to wallop a monkey the next time the latter faces toward the motor. I do not think I know just exactly what a wouff hong is. Probably some piece of apparatus used in the southern states to beat monkeys with.

It is this form of uninteresting "conversation" which clutters up the air with QRM. Of what moment is it to the rest

of the world that this fellow Blifsky is going to smear somebody's monkey with a wouff hong? When anybody relapses into such mental slop as to want to operate with a thing named a "wouff hong," he ought to keep his trouble to himself and not compel all of us respectable amateurs

BANG!

to listen to his drool. To slaves and slobber a lot of foolish twaddle like this when that poor girl out in Illinois has not had a letter since yesterday, is plain wicked.

Sorry om qrm qrm 9vy few words schlipsh nuzzle his mucket faded undershirt cfrish reptg pain in neck sus gup om cul ark. This is a real relay, evidently. 9VY over in Fort Wayne is mixed up in it in some way. Whose undershirt they are talking about and what schlipshing one over is, I do not know exactly, although I have a rough idea. Whether the signals faded or the undershirt faded, or what was the matter with the sus gup of the neck of the undershirt, I'll be darned if I know.

Just cast a lingering look at this:—Biirgrmp bru rotary ge ge ugerumf om with my set rettysnitch spitty tone hit in potimus? Now what do you suppose the the poor gink was trying to say when he unreeled that? You have to guess a lot in wireless, and how would you guess this? Something is wrong with this fellow's biirgrmph, his rotary also has a bad case of the ugerumf and somebody around the place must have spit on his rettysnitch, because his tone was so rotten it hit him on his potimus. Sounds bad to me. Why will some people send such personal matter by wireless when the whole country can overhear it. It isn't decent, and it makes the QRM more rotten than ever, and just think of the way it makes a perfectly good log book appear.

I spent the better part of an hour trying to make out what ailed the poor fellow's biirgrmph, but had to give it up while I listened to a child with a spark coil scratch out this at a rate of around three words a minute:—how do s. . . . . . e . . . . . ? how be . . . . .? how do i cowp . . . . . cw . . . . . .v v v v v v v ——————— come in ? ? ? ark After a long wait another trouble maker with a bad cold in his head stumbled back with:—r r r r r r r r r r r ok ok please ? ? ? ark Another pause followed by the first little demon with:—r r r r r r r r qta qta qta pse rat . . . . . ve . . . . . .? pse ttt . . . . . .qta pse repeat ark. These brats kept this up for twenty minutes and they ended up just where they began.

What we ought to do is to organize an Anti QRM Association. Then let us elect for Chairman the worst plug-ugly we can find in these U. S. A. Then let us chip in a little money and hire a clerk with a bad disposition who will write letters threatening the life of everybody whom

Rubber band—Commercial tone.

the members report as causing needless QRM. If anybody gets balky, we will all join together and swear the gink is sending with a decrement greater than two-tenths, and so report to the local Radio Inspector. If the latter does not within

(Continued on page 35)

A Radio Survey

By J. O. Smith, 2LK

This article by Mr. Smith contains some data of great interest to every one concerned in long distance work. Mr. Smith is in the long distance game himself so he knows what he is talking about. If you have experimented trying to increase your sending range but can't get anywhere study this article. It will help you.—Editor.

FOR the pas two years, 2LK station, at Valley Stream, Long Island, twenty miles southeast of New York City, has been an efficient receiving station, but has never been able to get very far on the sending side. This year, however, the ability to cover ground has been successfully accomplished as a result of endless work and experiment carried on for one solid year, entirely on the sending side.

It was demonstrated early in the experiments carried on that the bar to efficient radiation lay in the ground system of the station, the usual city water-main connections not being adequate. As a result the ground system of this station is undoubtedly a novel one in its proportions as compared to the antenna, but as the ground here consists entirely of sand, it was necessary to adopt heroic measures.

The lead from the oscillation transformer to the ground distributing point is of brass ribbon four feet long. The ground system consists of several large plates buried deep in the ground, fifteen ten-foot pipes driven vertically into the ground in a semi-circle around the station and connected by individual stranded wires and 1,000 square feet of chicken netting on top of the ground under the antenna. Every joint in the ground system was carefully made and soldered.

The antenna itself is an inverted L, 80 feet long and ranging from 60 to 90 feet in height, composed of four wires, without joints. The sending outfit consists of a one Kw. transformer, glass plate, in oil, condenser of .01015 mfd., rotary gap of sixteen studs turning over at 1700 R. P. M., and and oscillation transformer with six inch separation. The station radiates four amperes on the regulation amateur wave and the exact decrement is .185.

The receiving at the station is done on a Godley 180-20,000 meter regenerative set, usually with one audion, but occasionally on a one-step amplifier.

During last October, 2LK station successfully handled fifty-six relay messages and worked 2AGJ at Albany and 8VX at Buffalo, regularly both ways in the case of Western traffic. Traffic for the East was sent to 1ZD, and 1IZ. At numerous times during the month, this station was in touch with many other distant stations as well as hearing many. When not busy with relay work, the following were heard, and some were worked;

First District 1VN, 1IZ, 1ZD.
Third District 3TQ, 3ZW, 3AEP, 3QV.
Fourth District 4DI.
Fifth District 5DU, 5ZM.

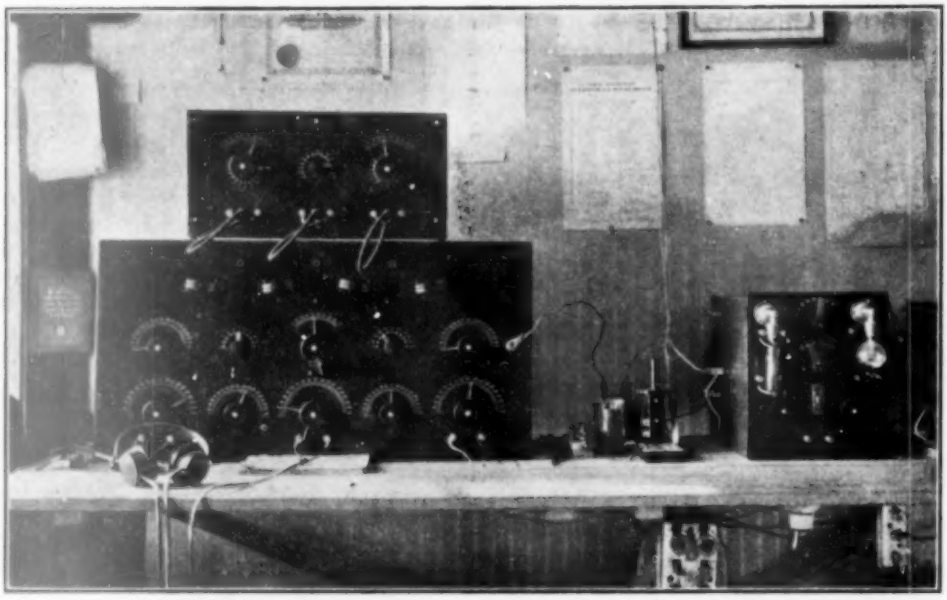
Eighth District 8NH, 8NF, 8AEZ, 8OH, 8CS, 8AAK, 8CL, 8KS, 8JJ, 8AHR, 8JA, 8AHM, 8NQ, 8AOR, 8AOI, 8QK, 8ACK, 8AAK, 8QD, 8VX, 8FE, 8AIM, 8CO, 8QB.

Ninth District 9PC, 9KV, 9JI, 9VY, 9MY, 9AAB, 9GY, 9TR, 9NN, 9IK, 9UQ, 9GJ, 9LR, 9HQ, 9GE, 9JB, 9GU, 9ADB, 9CF, 9ABD, 9EG.

A little study of the location of the stations in this list determines the fact that nearly all long distance work has been done with those situated on a westerly and northwesterly direction from New York.

This is very true so far as 2LK is concerned and from what it has been possible to learn from other operators of stations in the Second District is true in the case of majority of long distance stations.

Using an outline map of the United States and indicating the location of the stations heard and worked, further establishes the fact that the dependable long-distance range for Second District stations lies principally West and North-



west, shown as the clear space. The shaded parts of the map represent doubtful or impossible territory.

The matter can be summed up as follows: In the case of First District stations it is seldom that accurate work can be done with them. Fading is very pronounced. Some of the First District stations fade out in the middle of the letter L, and go clear out of sight doing it. They pop up again just as suddenly.

The writer is inclined to think that a great deal of trouble in establishing dependable communication between First and Second District stations is due to the drag imposed on the feet of the waves of the North and South ranges of hills, bearing considerable low grade iron ore, although not in such quantity as would pay for getting it out.

That First District stations can work right over the Second District stations, is undoubtedly due to the fairly well established theory of refraction, thus jumping these hills.

The same unsatisfactory condition exists in the case of Third District stations, but the writer can assign no reason for it. Philadelphia, about 100 miles away, undoubtedly contains a great many amateur stations, but they are seldom heard at 2LK, with one or two exceptions. It has been hard work getting traffic into and from Philadelphia until just recently, but it can be handled pretty well at the present time.

Fourth District stations are as scarce as Ones and Threes, but occasionally come through on a freak.

Eight District stations are regular visitors, as the list shows. It is fairly safe to assume that traffic can be handled promptly and accurately with several stations in Ohio and Michigan.

Ninth District stations have also been coming through in fine shape so far this fall. This station has exchanged messages several times with stations in Chicago and St. Louis.

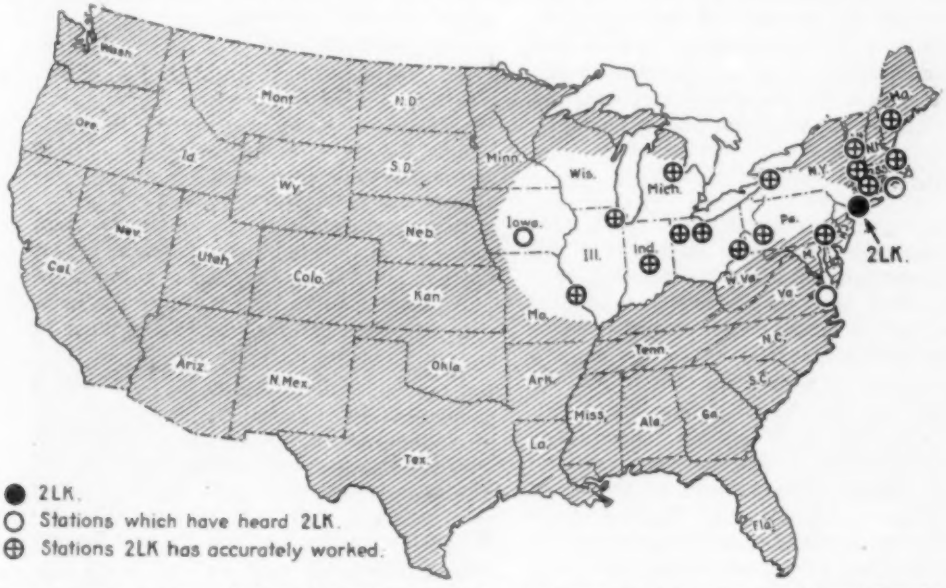
The opinion prevails among amateurs of the Second District that it is very hard usually to "raise" an Eighth or Ninth Dis-

trict station, and the tendency is to lay this to apparently inferior receiving apparatus in the case of the Middle-West stations. This is hardly fair and not altogether true.

Here in the East, especially in the case of the Second District, the long distance interference comes from practically only one direction—West. In the case, particularly, of Eighth District stations, interference comes from all four directions and is of several times the volume of that experienced by Eastern stations. The writer has listened in at some of the Eighth and Ninth District stations and knows this to be a fact.

This, in a large measure, accounts for the difficulty experienced by the Eastern fellow in raising the Western station—his call is lost in the jumble. Of course, if his signals are strong enough to override the interference, he gets his man—otherwise he doesn't.

An interesting point that should be mentioned is the longest distance 2LK station has worked has been in a direction exactly at a right-angle to the plane of the antenna, which runs Northwest-Southeast. The point referred to is St. Louis. In a letter from Mr. B. R. Lydick, of 9GY station, he says that 2LK signals have been coming out there strong for a month past. St. Louis is 850 miles on an air line from Valley Stream.



MIKADO REPLIES TO WILSON

Japanese Emperor Sends Greetings to President by Wireless.

San Francisco, November 16.—Emperor Yoshihito of Japan replied last night by wireless to the message of President Wilson, relayed from Bolinas, Cal., yesterday. The emperor's message said:

"It affords me much pleasure that the first use of the installation of wireless telegraphy between Japan and the United States has been to transmit your cordial message. In return, I send this expression of my thanks for the good wishes exhibited towards me and my people and of the hearty desire entertained throughout Japan for the continued prosperity and welfare of the United States."

Efficient Short Wave Transmitting

By "Dr. Radio."

PART TWO

IN Part One, printed in the December issue of this magazine, a general survey of the problem of efficient transmitting on short wave lengths was considered. It is the intention in this article to consider the details involved, and this with as little mathematics as possible.

GROUNDS.

Without a good ground, or earth connection, we cannot avail ourselves of all the advantages of a good condenser or a good rotary gap, or a good transformer. Among many amateurs an altogther inadequate notion prevails as to the magnitudes operating in a radio ground system. Mr. Marconi discovered that a "good contact with the earth" or to "some very large conducting body" tremendously improved the practical working of the Hertz vibrating conductor. Mr. Marconi went into the subject with great care and a summary of what he found is well worth the consideration of every amateur who wishes to have his signals heard distances exceeding one hundred miles.

Mr. Marconi found first that it is necessary to have an extraordinarly good contact with the earth if all the possibilities are to be attained. Before his time, a copper plate sunk in the ground was considered the ultimate necessity for a ground connection. Mr. Marconi found that it required very exceptional soil conditions indeed to make a copper plate effective as a ground. He enlarged his plate and he improved his conditions. He added more plates and he still further improved it. He added wires to these plates and got still better results. He added elaborate systems of wiring some not in contact wih the ground at all and still further improved matters. In other words, capacity in the ground system became a very important matter of there was the slightest question of the low resistance of the earth in contact with his metallic ground terminals.

This brief outline of ground development is given in order that it may be appreciated that a ground connection is not an easy thing to get. Mr. Marconi's stations were invariably located in remote places where he had to provide every bit of ground connection himself. The impression prevails among amateurs that they being located where water pipes are available, that they have no need to consider grounds. This is where the amateur suffers as seriously as in any place in his entire transmitting system.

At first thought it would seem as though connecting to the city water pipes would be connecting to a "large conducting body." Practice has proven that it is not. The writer has never yet found a water pipe which is not very considerably improved by adding the gas pipes. He has arranged grounds with lead wires all separated from each other, and added these one after another noting the needle of a hot wire ammeter as he did so. Each additional ground system added to the current reading, and it was not until a ground connection many times more elaborate than the water pipe was reached that no further increase in current reading occurred.

Just why the water pipe or the gas pipe does not satisfy the conditions of a low resistance contact, is not entirely plain. The system is certainly a large one, since it extends all over the city one lives in, but for some reason which we will not take the time to go into here, the water pipes do not give enough ground effect. For the time being, this must satisfy the amateur wishing to improve his radiating efficiency.

There are several ways of augmenting the ground system. The water pipe is a

good one to start with, and we will assume that to this has been added the gas pipe, where allowed, any steam heating pipes there may be available, and any furnace pipes. In other words, all the pipe systems of every kind available, should be connected to. Each one should have its own separate lead and each lead should consist of a conductor having a very large surface. If a solid wire is used for economical reasons, then it must be a very large one indeed. Rather than use the wire, the amateur should, if possible, use either flat ribbon or multi-strand cable. Under no circumstances should deficient leads be considered, for they invariably result in disappointment.

Assuming that the station is all ready well connected up to all the piping system available, it should be understood that approximately 33 per cent only of the ground system is done. The remaining 67 per-cent must be obtained by capacity-grounds. The latter are frequently tained by the use of copper plates, copper ribbon, copper wire, or chicken coop netting. In practically every amateur station transmitting efficiently, either one or all of these auxiliary grounds are used.

The copper plate is the old fashioned ground inherited from the electric light central station. It runs from a plate 2 inch by 4 inch to 4 inch by 8 inch, and is usually sunk pretty deep in the ground. A layer of 2 inches of powdered charcoal supports it and more charcoal is covered over it. This is supposed to cause moisture to remain close to the copper and to reduce the resistance of the earth contact. Where this plate is a very large one, and where it happens to be in good soil, it makes a good ground. In many cases, however, the soil is not suitable, that is, it is both dry and an indifferent conductor. In such cases, it is better to use the amount of copper in long ribbons or wire instead of solid plate.

A better form is a system of copper ribbon sunk in a system of radiating trenches. Pulverized charcoal is used as the bed on which the ribbon lies, and as its immediate covering. The copper ribbon not only exposes much surface and reaches over a wide spread, but it does this with the minimum amount of material. The standard 1 inch wide ribbon having a thickness of .005 is frequently used with success, and it lasts a very long time in ordinary soil. It offers a large capacity and it also reaches into as many different varieties of soil and moisture as the vicinity offers. It is considered by the writer, the best of all ground systems if enough of it is used.

Another form of ground contact is copper wire buried similar to the ribbon. It possesses many of the advantages of the ribbon, but more of it must be used in order to secure the same results. A form of wire frequently used, is chicken coop netting spread under the antenna. This gives wide spread, good capacity, many points of contact with the soil, but since it is usually made of tinned iron wire, it rapidly corrodes in some cases. While new, it acts very efficiently, but cannot be counted upon for any length of time. In using this mesh, care should be taken to solder carefully all possible joints which connect up different pieces of the netting or its leads.

Still another form of ground is the driven pipe. Every Electric Light Company, and every Telephone Company, can supply what they call "ground rods." These usually consist of a seven-foot length of either 1 inch or 1¾ inch standard galvanized iron pipe. One end is pointed, and the other end fitted with a cast brass cap with hole for soldering in lead wires. When driven into the earth, they form a very good contact. The lower end of the pipe is very likely to be in moist earth, and the contact is very likely to be a good one owing to the tight fit of the rod in its hole. It is customary to keep on driving down these pipes under the antenna until further additions add nothing to the radiating current. The amateur will find this form of ground a good one, but usually expensive since he can keep on improving his current reading longer than he can afford to keep on buying pipes.

In closing this consideration of ground contact, a word should be said as to the magnitudes of the currents distributed. An amateur is likely to regard his ground connection as carrying a current his ammeter reads, and hence he does not need

much ground if his current reading is low. He does not realize that a station working on one kilowatt input and 200 meters wave length, and radiating five amperes, must have a ground connection capable of handling many times this current value. The ammeter reading represents the average temperature of the fine copper wire inside the instrument. It does not represent the actual current characteristics by any manner of means. The actual current flows an extremely small part of the time, and if its average effect is to heat the wire hot enough to indicate five amperes on the meter scale, it is evident that while the current was actually on, it must have had a value nearer fifty amperes than five. Indeed, there are reasons to believe that at the actual contact with the earth, if the ground system has a small capacity, the current, while it is on, has a value of over one hundred amperes. Is it any wonder, then, that a ground of very large proportions is needed?

LEADS.

By lead wires, we mean all leads connecting instruments to antenna or ground or from rotary gap to condenser or from the latter to oscillation transformer. There is reason to believe that many amateurs do not grasp why leads should be short. In order to make this plain, let us assume that the station is to operate on the legal wave length, 200 meters and that the input is to be one kilowatt and that the best efficiency is to be attained. We will assume the rotary gap and the condenser are correctly proportioned also. It then becomes obvious that our antenna must be just as large as we can make it and have a little to lose in our oscillation transformer secondary. The latter should not be a great many turns or convolutions if a few convolutions will effect the energy transfer from the primary. In other words, every bit of the wire we can possibly get into the antenna or radiating system, should be got there, and there should be as little else as possible. This means as little lead as possible. If we could dispense with all lead wires, it is evident that our radiating system would be nothing but an antenna and a turn or two of oscillation transformer secondary. But this cannot be attained. The best we can do is to have our lead-in come as direct as possible from our antenna to our oscillation transformer and the lead from the latter to the ground should also be as direct and short as possible.

An interesting case which illustrates the opposite of the above makes the point stand out more sharply. A certain station had its instruments, antenna, and ground connection, so widely scattered and so far away, that a natural period of 200 meters occurred before any antenna had been put up. Here was a case where the leads were so long, that they used up all the length available with the wave length in question. As leads are very poor radiators, as a rule, this station did not operate very efficiently.

Many amateurs suffer from unfortunate arrangement of their premises. In commercial work, the station, the antenna and the ground are all determined in the first place, and the best compromise effected before the premises are laid out. In the case of the amateur station, just the opposite occurs. The antenna, ground and station location, must suit the premises. Sometimes the station is located in the top of the house, and the antenna can only be erected at the back of the house. This makes a long lead-in and also a long ground wire. This is bad. Some times a station may be located on the ground floor or in the basement, but to reach the antenna, the lead-in must make a circuitous journey around the end of the house. This is bad, but better. The best of all is where the station is in the basement and directly under the antenna. The lead-in is then the shortest possible and the ground wire the shortest possible. If the antenna is as large as possible, and the ground is adequate, such a station can be made amazingly efficient as a transmitter.

It must be remembered that voltage values are higher in stations on the second or third story, and having long ground leads. It is difficult to avoid leakage, in ordinary amateur practice, under these conditions. When the station is in the basement and the ground lead wire two feet or less long, the voltage values are very low, and leakage negligable. Cur-

rent values are of course higher in the basement location, but the amateur is usually better able to cope with high current values, than with high voltage values. The writer has seen a station where the hand can be passed any where along the throw over switch, and the ground wire, without any sensation of current at all. The ground wire is so short and the ground connection so good, that even the heavy current passing is satisfied, so to speak.

In the leads between condenser and spark gap, and oscillation transformer primary, the same rule should be observed as to economy of length. The ideal condition is one in which the condenser merges into the spark gap and the latter into the oscillation transformer primary. In this case, there would be no waste, induction or capacity. The condenser would have all the capacity in the form of condenser and the oscillation transformer primary would have all of the induction in the form of turns for effecting the energy transfer to the secondary. Of course we cannot have them "merge" so we must do the next best thing and have them short.

The material of these leads is very important. In some cases, the current values circulating, are in the hundreds of amperes, and unless very large surfaces are presented, we will suffer heavy losses. The lead from condenser to spark gap need never be changed and this may be made of two or three ribbons. The lead from the spark gap to one terminal of the oscillation transformer, may also be fixed and this should be several thicknesses of ribbon. The lead from the other terminal of the oscillation transformer to the condenser, must be flexible enough to permit of adjustment for tuning, and unless care is exercised, this desire for something flexible causes a bad loss to be introduced. Any bit of flexible cord is frequently used. What should be done is to use several strands of flexible cord, the more the better. After all tuning has been settled, it is good practice to put in a fixed ribbon in the place of the flexible cable.

In connecting leads to terminals, losses are frequently introduced because large surface is not presented at the terminal. This should be avoided in an efficient station. Ribbons should be fastened to terminals in a manner which gives broad area of contact, and proper distribution to the surfaces of the new conductor.

ANTENNA.

The one great difficulty which confronts the amateur when it comes to improving his antenna, is the question of height. It costs money to get up into the air if there are no natural opportunities in the way of trees or buildings. The value of height is always important but the amateur must understand that it varies with the surroundings. An eighty foot high antenna in one case, might bring the wires below surrounding buildings, making it about as efficient as though it were inside one of the buildings. On the other hand, a forty feet high antenna might bring the wires clear of all nearby objects. It is very important to keep away from other metallic conductors, and of course the higher the wires, the better the radiating efficiency per unit of energy used.

Capacity is what the antenna is supposed to have. Many amateurs overlook this, and we see antenna with two wires spaced two feet apart and an oscillation transformer secondary with sixteen turns. This antenna would be better if it had more wires of a greater spread, and the capacity increased so that the desired wave length would be attained by three or four turns, or even less in the oscillation transformer.

The shape of the antenna finds division of opinion. The writer at least knows of no absolute measurements upon which to base exact statements suitable for the amateur. The great majority of short wave stations employ the inverted L antenna. A few use the T form, and a very small percentage use the fan or the umbrella. It is the opinion of the writer that if the antenna is high, and there is plenty of it, and its natural period is within twenty per cent of the wave length to be transmitted, and if the insulation is good, it is of secondary importance what the form is.

The insulation of the antenna and its lead are more important than the ordinary

amateur gives it credit for being. There seems to be a lack of appreciation of the voltage at the far end. Those antenna with small capacity have to obtain their energy output by potential and sometimes the strains are very great indeed. One cannot be too careful with the insulation at the far end.

The lead-in insulation is frequently very bad indeed in the amateur station. This does not refer to the amateur who is in wireless temporarily as a recreation. The writer is referring to serious minded station owners who wish to be identified in long distance work. Many of these have spent considerable sums of money in procuring the best apparatus, and the writer has one in mind where a 20,000 volt Thordarson transformer is used, and where the lead-in was fastened to the wooden shingles of the house by means of iron staples. This owner was blaming mountain ranges and nearby mineral deposits for his low transmitting efficiency. Other stations will have the lead-in fastened onto fibre blocks. Still others to hard rubber blocks. It is seldom that a lead-in is seen which has to be supported and which is insulated as though the owner appreciated the conditions. If possible, the amateur will do better to make some sacrifice in order to have his lead-in run absolutely clear from the wall insulator in his instrument room, to his antenna. If some form of intermediate fastening is obligatory, then let it be by means of several high grade insulators in series.

A good rule to follow in providing for lead-in, is to arrange matters so that the lead-in never comes nearer than eight feet from any object, other than its supporting insulators. Tremendous losses will occur if a lead-in runs close to metal gutters, drain pipes, cornices, roofs, or guy wires. Each of these becomes an oscillation transformer on its own account, and sometimes the coupling is close.

Before leaving this matter of antenna, leads and ground, the writer wishes to emphasize the fact that no amateur station can hope to attain even a moderate efficiency without a wave meter and a hot wire meter. The wave meter is an absolute necessity in order that the antenna can be increased until its natural period is within 20 per cent of the transmitting wave. It is also of immense assistance in determining amount of condenser to be used. The ammeter is equally essential in securing resonance between the open and closed circuits. Its help in improving ground connection alone is worth all its costs. The best wave meter to use is one in which a milli-ammeter indicates the resonant position. More accurate observations can be made this way than with the small flashlight lamp or the head phones and detector.

The above study is not complete without a consideration of the condenser, spark gap and oscillation transformer also. These will be considered in a later article and while more mathematical treatment will be necessary, the subjects will be handled strictly from an operating standpoint.

Desplaines Man's Invention Presented to War Department For Use With Wireless

THE Chicago Daily Tribune says: R. W. Dean of Desplaines, contractor and inventor, announced he has made the war department a present of his most recent invention. He calls it a "pneumatic telescopic tower," and it is designed for the use of army wireless field sets.

Mr. Dean is the man who, after several months' experimenting, announced the discovery of a preservative for eggs, obviating the necessity of cold storage.

The pneumatic wireless tower is mounted on an army motor truck. It is made up of tight fitting sections of thin, light steel tubing. Each section is made airtight by means of leather washers. In the bottom of the motor truck is an air pump connected to the engine of the truck and

(Continued on page 22)

More Results of Naval Tests

THE District Communication Superintendent of the Puget Sound District has completed his first test with the amateurs in his District. These tests have been developed as a result of our suggesting the matter to the Naval authorities, and it has worked out better than even we expected. Not that we mean that better communication efficiency was developed than we expected, but rather that the weaknesses of our amateur methods were emphasized more strongly. This is what we need more than patting on the back. When we know where we are weak, we can effect the changes necessary to improve matters.

Lieut. Blankenship's method of presenting the results is especially clear and we cannot do better than give it just as he submits it. Notice that out of forty-one stations, very high efficiencies for receiving were obtained at a speed of ten words per minute. This of course is "dead slow." We amateurs handle our relay traffic at about seventeen or eighteen words per minute, and if the signals are strong, we can handle twenty words a minute with ease in most cases. At ten words a minute, everybody seems to get better than 90 per cent. efficiency.

Notice also that there were three tests run, just as we suggested them, namely, A, giving plenty of advance notice of the exact date and hour of the test, B, giving only twenty-four hours notice by radio of the date and hour of the test, and C, giving no notice of any kind. From North Head Naval Station, 29 out of 41 got the A test message, 26 the B, and 18 the C. From Puget Sound Naval Station, 26 got the A, also 26 the B and 9 the C.

There are two points which we amateurs must take to heart as a result of this test. We are weak in not controlling QRM among ourselves. Many amateurs would have done better in this test if it had not been for entirely unnecessary transmitting by local stations. It is another case of "conversation" and needless signalling. It emphasizes once more the great importance of some official division of time when it will be unlawful to transmit anything but the most important matter. The other point is uncertainty among us amateurs as to regular hours of duty. This is something which depends solely upon our enthusiasm. We are not paid for sitting at our instruments every night in the week for a certain number of hours and unless we are fired with the real stuff in the way of enthusiasm, it is easier to sit around and loaf than it is to operate the station. There is no way to control this but our experience during the last six years in amateur radio work indicates that the temporary ones become gradually weeded out and the real enthusiasts remain. A real amateur radio enthusiast never gets over his enthusiasm whether he lives in the country, or in a flat in a big apartment house in the middle of the city, he finds a way to get a wire up in the air and he is pretty regular at his instruments. When the number of these dyed-in-the-wool enthusiasts is great enough there will always be a goodly number on duty every minute of the time from seven to twelve p. m.

Lieut. Blankenship's original notice was as follows:—

OFFICE OF DISTRICT COMMUNICATION SUPERINTENDENT

PUGET SOUND DISTRICT

Navy Yard, Puget Sound, Wash.

Bremerton, Wash., October 12, 1916.

Circular letter to all Amateur Radio Operators in Puget Sound District.

Dear Sir:—

TEST A. On November 1, 1916 at 6 p. m., the North Head Naval Radio Station (NPE) at the mouth of the Columbia River, will send a test message to all amateurs, transmitting 1512 meters

and at a speed of ten words per minute. It is requested that upon reception of this message you have some witness certify as to the reception and that you mail a copy of the message as received to this office.

The Puget Sound Naval Radio Station (NPC) at Bremerton, Wash., will send a test message at 7 p. m. November 1, 1916, to all amateurs, transmitting on 1512 meters and at a speed of ten words per minute. It is requested that upon reception of this message you have some witness certify as to the reception and that you mail a copy of the message as received to this office.

TEST B. Information will be broadcasted by the North Head and Puget Sound Stations as to test B and this information will be imparted 24 hours previous to this test. Test B will otherwise be as per test A. A copy of the message received and certified by witness is requested.

TEST C. Same as test A, except no advance information as to time of sending message will be given. Copy of message as received and signature of witness is requested.

Yours very truly,
E. J. BLANKENSHIP.

OFFICE OF
DISTRICT COMMUNICATION SUPERINTENDENT PUGET SOUND DISTRICT.

Navy Yard, Puget Sound, Wash.

November 23—1916.

Mr. Hiram Percy Maxim,
President, The American Radio Relay League,
Hartford, Conn.

Dear Sir:

1. Tests with Amateur Radio Operators, of this District were conducted in accordance with my Circular Letter of Oct. 12, 1916, to all Amateur Radio Operators in the Puget Sound District (Enclosure A.)

2. I have received reports from 41 Amateur Radio Operators in the Puget Sound District, and have graded these operators in their ability to receive at the rate of twelve words per minute in percentages as follows:—

	Name.	Address.	Percentage
1.	Blagen, H. W.	Hoquiam, Wash.	100
2.	Bolstad, A. L.	Seattle, Wash.	90
3.	Campbell, A. C.	Lewiston, Mont.	100
4.	Drake, Edward F.	Tacoma, Wash.	100
5.	Davis, E. P.	Portland, Ore.	100
6.	Dann, Percy W.	Portland, Ore.	100
7.	De Guire, Olfan	Silverton, Ore.	100
8.	Demick, Lloyd E.	Portland, Ore.	100
9.	Drinker, Russell	Portland, Ore.	99
10.	Dailey, Arthur C.	Everett, Wash.	90
11.	Davis, Herbert A.	Seattle, Wash.	98
12.	French, A. J.	Carlton, Ore.	94
13.	Gale, Charles W.	Portland, Oregon	98
14.	Goodner, Ernest F.	Seattle, Wash.	95
15.	Hunter, Guy A.	Port Townsend, Wash.	100
16.	Howard, Cecil C.	Portland, Ore.	98
17.	Hayden, Max	Toledo, Ore.	94
18.	Hamilton, O. J.	Seattle, Wash.	90
19.	Josephson, Carl L.	Astoria, Ore.	100
20.	Johnson, Clifford	Tacoma, Wash.	100
21.	Mason, Dwight A.	Tacoma, Wash.	100
22.	McGee, Donald E.	Hoquiam, Wash.	100
23.	Manca, Angelo C.	Seattle, Wash.	100
24.	Mahon, LeRoy J.	Astoria, Ore.	96

	Name.	Address.	Percentage
25.	Moe, Edwin E.	Tacoma, Wash.	90
26.	Moore, Alvin	Portland, Ore.	92
27.	Mitchell, Walter	Seattle, Wash.	96
28.	Noorlin, Paul	Portland, Ore	100
29.	Nicholson, W. Otto	Tacoma, Wash.	99
30.	Ruth, Sebastian	Lacey, Wash.	100
31.	Ray, James	Seattle, Wash.	96
32.	Stenso, Alvin	Tacoma, Wash.	99
33.	Spike, Clifford	Tacoma, Wash.	99
34.	Stinson, Leo	Hoquiam, Wash.	99
35.	Spencer, Guy E.	Portland, Ore.	95
36.	Simpson, William	Salem, Ore.	90
37.	Trapur, Robert E.	Port Townsend, Wash.	100
38.	Trumbull, Wm. L.	Seattle, Wash.	93
39.	Wright, Raymond F.	Port Orchard, Wash.	100
40.	Williams, Charles E.	Seattle, Wash.	98
41.	Wallace, George H.	Vancouver, Wash.	98

3. Amateurs were asked to give suggestions on the Tests and from these suggestions I have found that the tests were conducted too early in the evening. Also there was interference particularly at Portland from the Y. M. C. A. Set and Lents, Oregon, KFU. Some Amateur Stations interfered which should not have occurred as Circular letters concerning the test were sent to all Amateurs.

4. The results of the Tests are encouraging. If not already designated it is suggested that a competent head of the Amateurs of this District be designated with whom I may arrange future tests.

5. In assigning marks in paragraph 2 above, due allowances were made for interference. Enclosure B is a table showing which messages were received by each operator and percentage correct.

E.J. BLANKENSHIP.

The results of the test in detail were as follows:

No.	Name	North Head			Puget Sound		
		A	B	C	A	B	C
1.	Blagen, H. W.	100	100	100	100	100	
2.	Bolstad, A. L.	100					
3.	Campbell, A. C.		100	100	100	100	100
4.	Drake, Edward F.				100	100	100
5.	Davis, E. P.	100	100	100			
6.	Dann, Percy W.	100	100	100		100	
7.	De-Guire, Olfan	100	100	100			
8.	Demick, Lloyd E.	100	100			100	
9.	Drinker, Russell,	100	100	95			
10.	Dailey, Arthur C.				80	100	
11.	Davis, Herbert A.	100	85	98	100	100	90
12.	French, A. J.		95		98	90	
13.	Gale, Charles W.	100	98				
14.	Goodner, Ernest F.	100				95	
15.	Hunter, Guy A.				100	100	
16.	Howard, Cecil C.	97	100				
17.	Hayden, Max	98	90				

No.	Name	North Head			Puget Sound		
		A	B	C	A	B	C
18.	Hamilton, O. J.				95	20	
19.	Josephson, Carl L.	100	100	100	100		
20.	Johnson, Clifford				100	100	
21.	Mason, Dwight A.	100	85	100	100	100	
22.	McGee, Donald E.	100	100	100	100	100	
23.	Manca, Angelo C.	90	90	90	100	100	100
24.	Mahon, LeRoy J.	90	97	100			
25.	Moe, Edwin E.	100			100		
26.	Moore, Alvin	100	83	90		98	
27.	Mitchell, Walter				96	95	
28.	Noorlin, Paul	100	100				
29.	Nicholson, W. Otto	100		100	100	98	100
30.	Ruth Sebastian	95	100	100	100		
31.	Ray, James	90	95		95	90	
32.	Stenso, Alvin	100	100	90	100	98	
33.	Spike, Clifford				100	100	98
34.	Stinson, Leo	80			98	100	94
35.	Spencer, Guy E.	100	50				
36.	Simpson, William	88	99		85	90	
37.	Trapeur, Robert E.				100	100	
38.	Trumbull, Wm. L.				93		
39.	Wright, Raymond F.				100	100	
40.	Williams, Charles E.	100	98	90	100	98	100
41.	Wallace, George H.	98	98	99			

DESPLAINES MAN'S INVENTION

(Continued from page 18)

a compressed air tank of large capacity, which is connected to the base of the hollow tube by an air hose and check valve.

"The tower can be erected almost instantaneously," said Mr. Dean. "Jacks on the base push it into position and then the air is turned on. A pressure of twenty-five pounds to the square inch will shoot it up to its full height. By opening the air valve the tower will drop back to its shortest length and can be moved immediately to some safer position. The present plans call for a 100 foot tower, but it is possible to make it 200 feet high.

"I offered the plans to the secretary of war some time ago, and have received from Secretary Daniels the usual form letter of acceptance.

"The portability of the tower, the speed with which it can be erected and taken down, and its height are features which make it superior to anything the army now is using. The Marconi company sent a man to look it over and made an offer for my rights to it, but I prefer to give it direct to Uncle Sam."

*****

GOVERNMENT MAY BUY EVERY RADIO STATION.

Washington, Dec. 9—Authority to establish a Government monopoly or radio communication between ship and shore stations through the purchase of all private radio stations in the United States is to be sought from Congress.

A bill is being framed by a special Government board, according to Commander D. W. Todd, director of naval communications.

"The necessity of strong Government control becomes more necessary as ship and shore stations increase." Director Todd says in his annual report to-day. "Interference and consequent inefficient communication will continue until such control is obtained."

Early Morning Working

Our eastern Trunk Line Manager is trying out a new one. This time it is working between six and seven-thirty a. m. when there is practically no QRM from either Commercial or amateur and when QRN has also laid down for a nap. Mr. Hebert tells us that it is the finest thing yet. Everything is beautifully quiet, and if you have a bundle of messages which you could not get rid of at night, you can unload the whole business in a short time in the morning.

This suggests something. Why do not more of us get up before breakfast and handle some of our traffic and run some of our necessary preliminary long distance tests? Most of us have our instruments where we do not have to dress elaborately for the function of operating. One can hop out of bed, smother the alarm clock, get into a pair of slippers and a bathrobe and in three minutes, can have the phones adjusted, and the audion going. When the rest of the family get up, we can QRT, shave, dress, and have breakfast as per usual. It sounds very attractive and the long distance fellows will undoubtedly be helped by it. This staying up until one and two o'clock in the morning, and going to work at eight is not conducive to good health if persisted in for any length of time. On the other hand, going to bed early and getting up early, has the sanction of the old fellows who promise wealth and health to those who practice it. But, keep this strictly confidential. Don't breath a word of it to the "little boy with the spark coil."

Welcome 1917

Stand up, fellows, and take off your hats to good old 1916 as he limps away over the horizon never to return. He has been pretty good to us amateurs, and we shall always remember him with affection. He saw us through many of our greatest struggles and he knows how hard they were to us and how much credit is due for the successes we have been able to attain. In no previous year has amateur wireless advanced so much as it did in 1916. Instead of a mere handful of stations having the distinction of working 500 miles, we now have several hundred able to work close to 1000 miles. This improvement has been due to our A.R.R.L. as much as anything else, because it has been the means of keeping us posted regarding what the other fellow has done. Our League and its official organ, QST, has cemented us all together into an organized body of interested workers, and when this occurs, advancement and improvement follow as a natural course of events. The year 1916 saw the greatest fruit of this organization work and therefore we say, hats off to old 1916 as he disappears, and before putting them back on, let's all turn around to the freshly brightening east, and welcome the little fellow, 1917, as he toddles toward us. He bears a pleasant smile and he looks like

the making of a strong man. Let's encourage him, fellow amateurs, and live in the belief that he has within him, coming improvements and advancements in amateur wireless which will beat even what good old 1916 did for us. Here's to you, 1917.

QRM

This seems to be a QRM number. When we rolled up our editorial sleeves, and started to pick out the stuff which was to form the January issue, it seemed to us that everything had to do with QRM. Even our old friend, "THE OLD MAN", seems to have been bitten by this QRM bug.

There is no doubt that we are fast approaching a time when something must be done about this matter. Our relay traffic has grown so enormously and much of it has become of enough importance to make it worth while to consider means of controlling unnecessary QRM. The regular interference when handling interstate relay traffic is bad enough, now that there are so many stations able to work in excess of 500 miles. But, the irregular and entirely unnecessary interference caused by thoughtless individuals is something which ought to be clamped down and held under control.

The forms of this unnecessary interference are usually, Conversation, Improper Calling, Unnecessary Repetition, Thoughtless Testing, and the Infantile Efforts of the beginner with a small spark coil. The first, Conversation, ought to be stopped by general agitation of the subject among ourselves. We can, if we want, make it bad form to indulge in the long conversations which all of us know only too well. We have the power to make it very unpleasant for any one who will not consider the general good. This power is the boycott. While it is illegal to boycott in business, it is not illegal to decline to answer a certain station's call, nor to decline to ever call that station. Once we all agreed never to work a certain station, that certain station would be pretty much out in the cold and wireless would rapidly lose its interest. Our experience makes us feel that very few fellows have the inherent temperament and desire to be unpleasant. We all seem to be a pretty fair kind. We therefore have confidence that much could be done by agitating against "Conversation" after any early hour in the evening.

Improper Calling can also be improved by emphasizing its bad form. We all recognize how often some of us call improperly, and how much time is used up by it. Unnecessary Repetition of a message comes in the same category. Some of us are simply terrible. A steady, even and moderately slow transmission makes repetition many times entirely unnecessary. Thoughtless Testing is simple viciousness. To make measurements of one's radiating current during hours of relay works is an indication of the most aggravated form of radio selfishness. When it comes to the efforts of the beginner with the spark coil, we have something more difficult to reach, because he is not one of us, usually. He never heard of our A.R.R.L. nor our QST, and he uses his initials for call letters. He does not seriously regard the taking out of a Government License, and he is sometimes only temporarily interested. What to do with him, we do not yet know, and we await suggestions with much interest. In any event, let us think about this QRM matter and decide that we will agitate it in the proper way from now on.

Call Books

The question of call books comes up every now and again. It is a matter which is hard to decide. There are arguments in favor of our own private A.R.R.L. Call Book. On the other hand, what is the Government book? If we had plenty of money, it would be one of the good ways to get rid of it by distributing some of it among certain clerks, paper manufacturers, printers and Uncle Sam's post office. We

have done it before, but we have always lost money because there were not enough of us who wanted the Call Book bad enough to pay thirty-five cents for it. We are therefore a little Call-Book-shy. We can see that there is a form of Call Book which might be helpful iin the routing of a message to an obscure point, but it does not appear at this writing that such a book is demanded just yet. In the mean time we have the Government Call Book, and the knowledge of the stations we hear nightly handling the relay traffic. If any one has anything to say on this matter, let them write it in. There is nothing like this business of expressing your individual opinion. It crystalizes the matter in the minds of a great many when they read the carefully considered opinion of some one else.

Our Growing Pains

Our A. R. R. L. and our QST are growing so fast that they hurt. To keep up with the ever increasing detail requires more and more hard work. As we look around and give our existing plant and equipment the "once over", we cannot but compare it with the situation in this same "office" a year ago. At that time, our wireless station looked like a pretty fair amateur layout. Now, the station is pushed into the background, and the place looks like a business office. We have an addressing machine, and the equipment for mailing our magazines on the first of each month, letter files and card indexes of the latest pattern, and where we once hired a broken down typewriter, we now own two. And all this machinery starts at eight o'clock Monday morning, and runs under high pressure from eight to fourteen hours a day until Saturday night. It will only be a short time before our present cramped quarters will no longer be able to contain us, and we shall have to move into one of the downtown skyscrapers. And, just think of it, this whole fabric is built upon this gradually spreading institution,the individually owned and controlled wireless station by means of which interstate communication is independent of all corporate control.

Call Letter Lists

Did you ever operate your audion getting a better and better adjustment, correspondingly better results, allthe while fearing that you would adjust too nicely and have the bulb spill? That is just what we are beginning to wonder at. We have started a fine thing in giving a list of stations heard throughout the Country, but like all good things, it can be carried to an extreme. We receive so many calls that one whole issue of QST could be filled with them This means the number must be limited by some logical plan We are going to offer a plan which will not only cut down the number of calls, but also will faciliate listing them up. Let us list stations which are distant more than 100 miles giving the location and distance in alphabetical order by calls. This little scheme will make it much pleasanter for everyone. For example, as to how the listing is to be done:

HARTFORD, CONN.
8AEZ, Lima, Ohio, 550 miles
9IK, Chicago, Ill., 800 miles.

The A. R. R. L. Transcontinental Relay

As we go to press, the details of this biggest of all big relay stunts are in the making. Mr. Matthews at Chicago is working on a northwestern outlet and also a passage by way of Little Rock, Dallas and Hollywood. Mr. Maxim has received several letters on the subject from station owners in the west and southwest, and all of them believe that it is only a question of QRM. No end of interest and excite-

ment is being manifested and if this will keep on long enough to reach the QRMers, the relay is as good as done. We hope to be in a position to print more details in the February issue. The relay may be run between now and that date.

Annual Dues

Remember that it has been decided among us that we are to pay annual dues from now on. As we have already stated, this money is to help defray the expenses of running the office work at Hartford Headquarters, Nutley District Headquarters. Chicago District Headquarters, and Los Angeles District Headquarters. These dues amount to $1.00 per year, 8 1-3 cents per month, 1 9-10 cents per week. Not enough to hurt any of us very badly. They should be paid on the first of the year, for the coming year, and as this happens to be the first of said year, said dues are due. $1.00 pays up to December 31st, 1917, and $1.00 more brings twelve copies of QST during 1917. If the members will pay up promptly, it will save us all a lot more money than you would believe possible because it will save printing, mailing and addressing several thousand bills and subscription blanks. The cost of these gets up to $100 before you have time to turn around and this money comes out of all of us. The work comes out of us here at Headquarters. Therefore in the interests of reducing the resistance losses, attend to your League financial obligations as early as you can.

A Concert by Wireless

Lee De Forest Gives Amateur Operators a Treat Over the 'Phone.

Thousands of amatuer wireless operators within a radius of 100 miles of New York heard a wireless telephone concert given recently at the De Forest experimental laboratories at Highbridge. The entertainment lasted for more than half an hour, and operatic selections and popular music were poured into the telephone to be sent out in wireless waves to every listening ear in and about the city. Phonographic records were used and a special record was put on to oblige an operator "somewhere in Flushing."

Notice of the concert had been sent out several days ago, and so that amateurs were waiting with receivers clapped to their ears for the signal that would tell them that the performance was about to begin. All that the operators had to do to enjoy the music was to tune up to the wave length of the sending station.

Walter Schare was in charge of the concert, and after the first few selections had been played on the phonograph expressions of thanks from the unseen audience began to sputter into the receiving instrument. From Yonkers came a hearty vote of thanks, and one enthusiastic Staten Islander insisted on sending messages of appreciation several times.

The concert is one of a series planned at the laboratories. Indeed, it is the plan of Lee De Forest to establish a sort of wireless newspaper to which every amateur with an instrument can subscribe. In this way news can be telephoned and the interesting happenings of the day can be sent to listening ears "hot off the wire."

We are informed that the test will continue every evening from Monday to Friday inclusive, at 8:00 o'clock on a wave length of approximately 800 meters. The De Forest Company would deem it a great favor if those hearing the concert would report by mail.

WHO'S WHO IN AMATEUR WIRELESS

We shall publish each month two pictures of amateurs who have become known by call letters. This will draw us all closer together. We are often curious as to just what the other fellow looks like, and here's our chance to see.—Editor

R. T. ST. JAMES, 1IZ

Mr. St. James was born December 20, 1885 at Pittsfield, Mass. He was inoculated with the germ of radio about fourteen years ago when visiting the Mechanics Fair in Boston, where an exhibit of Marconi efforts was displayed. He was bitten badly with the germ and needed daily treatment to obtain relief. Fellow radio men have probably heard him in the throes of an attack almost any night after ten fifteen. The apparatus used at 1IZ was built from Mr. St. James' own design and generally changes model every summer during the warm weather. The best distance so far covered is Minneapolis, Minn., but this season even greater distances are hoped for.

Mr. St. James is an Associate Member of The Institute of Radio Engineers, a member of The American Legion Service and a holder of a First Grade Commercial License. He is the chief operator at the Mahauve Theatre at Great Barrington, Mass. He has just been granted a patent on important improvements for inspecting motion picture films. A large number of readers have heard his signals.

THE OLD MAN

WELL! WELL! WELL! LOOK WHO'S HERE. A picture of THE OLD MAN. It came in the mail, just like all his stories,

(Continued on page 35)

REPORT OF TRUNK LINES "B" and "F"

On November 22d, 1916, we mailed a card to every relay station on both our routes, asking them what work they could do in both transmitting and receiving on 200 meter waves. We received many replies to the same. This gives us data on just what each fellow on our route can do. We can keep the good stations and encourage the others to improve. Mr. Charles L. Austin of KDP has been appointed a Local Manager for Portland, Ore. With his help we expect to develop that end of Trunk Line F.

The following is a report of tests made on Trunk Line B by Mr. S. Kruse, Local Manager for Lawrence, Kans.

Saturday, Nov. 11, 1916.

Cape Girardeau, Mo. 9NN, transmitting to an intermediate station with unknown call, found the intermediate station was unable to receive. He then called 9EP and "shot it blindly." The msg. was received o. k.

Kansas City, Mo. 9EP, transmitted message to Lawrence, Kans. 9LQ, and from there it went to Topeka, Kans., 9JW, who called 9XT, 9ABE, 9IO, without results, and was obliged to report QSK.

Thursday, Nov. 16, 1916.

Break to the east.

Saturday, Nov. 18, 1916.

Cape Girardeau, Mo. 9NN, replaced by 9FW, who did not succeed in making himself heard. A test was run via Kansas City, Mo. (9EP); Lawrence, Kans. (9GR); Topeka, Kans. (9JW). But as before, 9IO and 9JT failed to respond. The following alternates have been appointed:

9FW for 9NN
9GR for 9LQ
9ABD for 9HX

9HX was found to be the unknown intermediate station. X being the unknown letter. Tests will be run each Thursday and Saturday, starting from 9NN, 10:00 p. m. Central time.

Changes in Stations.

9IO is installing a 1 k.w Thordarson.

9NN is erecting a new and larger antenna mast.

An attempt is now being made to run tests to 9LR at St. Louis, Mo., and 9IK at Chicago, Ill.

We are in great need of a station in western Kansas to connect between 9BG and KIX, and another in upper Illinois to work 9FY and 9IK.

(Signed) S. KRUSE,
Local Manager for Seefred Bros.

REPORT OF NOVEMBER TESTS.

Thursday, Nov. 2, 1916.

At 9:50 p. m., we sent out a QST for all to QRX for test msg. at 10:15 p. m. At that time we sent test msg. to and QSL'd by 6AAG (Ponomo). He called 6SR (San Diego) but no answer. Heard 6ZW (Bakersfield) and 6BY (Richmond). 6AAG called and so did we, but could get no answer. Test msg. was:

Relayers. All work for success. Seefred Bros. (Sent broadcast several times.)

Sunday, Nov. 5, 1916.

At 9:50 p. m., we sent the usual QST. At above mentioned time, we sent test msg. to and QSL'd by 6ZW. He called 6BJ (Centerville) but got no reply. We sent message to and QSL'd by 6AAG. 6ZW sent to 6RG and 6SR (San Diego) and got reply. 6ZW called 6FT (Palo Alto), but no answer, 6AAG broadcasted same. Test msg. was:

Relayers. We want good radio relay service. Seefred Bros. (Broadcasted same). Was acknowledged by mail from 6SI (Hayward) and 6HO (Piedmont.)

Thursday, Nov. 9, 1916.

Sent usual QST at 9:50 p. m. and followed with test msg. which was acknowledged by 6AAG. He called 6SR and

6RG with no reply. Called 6ZW with same results. 6AAG and we broadcasted same. Test msg. as follows:

Relayers. Who works best wins. Seefred Bros.

Sunday, Nov. 12, 1916.

QST and test msg. as usual. Received and acknowledged by 6AAG who had no trouble in getting it to 6RG. We both called northern relayers, but no response. The msg. was then sent broadcast. Test msg. was:

Relayers. Relay work can be done. Seefred Bros.

Thursday, Nov. 16, 1916.

QST and test msg. was sent out with the usual result. 6AAG to 6RG and 6SI. Then broadcast;

Relayers. Radio travels where it will. Seefred Bros.

Sunday, Nov. 19, 1916.

After the usual QST, we called northern relayers, but got no reply. Sent directly to 6RG. The broadcast msg. was acknowledged by mail from 6HO.

Relayers. Radio reaches remote regions. Seefred Bros.

Thursday, Nov. 23, 1916.

After the preliminary work, msg. was given to 6AAG, who seems to be always on the job. He was successful this time, giving it to 6SI, 6RG, and 6ZW. 6ZW handled it on to 6SR, and then the msg. was QST'd.

Relayers. Knock the skiddoo out of 23rd. Seefred Bros.

Sunday, Nov. 26, 1916.

Test msg. given to 6ZW at 7:00 p. m.

Relayers. Better service is wanted. Seefred Bros.

6ZW gave the msg. to "JS" (Lodi), 6WZ (Burlingame), 6BJ, and 6SR. Each of these stations QSL'd. "JS" and 6BJ tried to get msg. to 6YS, (Lacey, Wash.) and KDP (Portland, Ore.) Was given out broadcast.

Thursday, Nov. 30, 1916.

This was Thanksgiving Day, and we hoped to do some good relay work, but every one seemed to be busy eating. They were still at it at 9:00 p. m., so we sent the msg. any way. QSL'd by 6ZW. At 9:50 p. m. followed the usual routine to 6AAG, who sent it to 6FT. Also called 6RG with no reply. Broadcasted as usual.

Relayers. Thanksgiving greetings to all. Seefred Bros.

NOVEMBER LOG.

Using a galena detector, we heard and copied the following long distance amateurs: 6ZW, 6BY, JS, 6SR, 6RG, 6SI, 6BJ, and 6WZ. Communicated with 6RG, 6ZW and 6SR.

We were heard approximately 100 miles south of San Diego on WQI (Steamer Costa Rica) during October. Also heard by 6DM (Phoenix, Ariz.)

We copied U. S. W. B. from NAR on galena at 7:07 p. m., Sunday, Nov. 5, 1916. We wrote and received an answer from KIE, that the station JJC we heard was Funabashi, Japanese naval station, near Tokio.

(Signed) SEEFRED BROS. 6EA.

*****

LINE UP OF TRUNK LINES

Trunk Line B

PORTLAND, Ore.
KDP and 7JH
LA GRANDE, Ore.
7ZH
BOISE, Idaho.
7CE
KUNA, Idaho.
"HER"
SALT LAKE CITY, Utah
6ZI, 6ZV, and 6SL
RICHFIELD, Utah
6AL
VICTOR, Colo.
KIW
DENVER, Colo.
KIX
?
?
LINCOLN, Neb.
9AHR
SAINT JOSEPH, Mo.
9HU
LEAVENWORTH, Kans.
9ALS
TOPEKA, Kans.
9QV and 9JW

LAWRENCE, Kans.
9LQ and 9XP
KANSAS CITY, Mo.
9XK, 9MQ, 9EP and 9LO
COLUMBIA, Mo.
9HX
CAPE GIRARDEAU, Mo.
9NN

Trunk Line F

SAN DIEGO, Cal.
6SR and 6RG
POMONA, Cal.
6AAG
LOS ANGELES, Cal.
6EA
BAKERSFIELD, Cal.
6ZW
FRESNO, Cal.
(6RD) and 6ZF
CENTERVILLE, Cal.
6BJ
SAN JOSE, Cal.
6AGW
PALO ALTO, Cal.
6FT
SAN FRANCISCO, Cal.
6BJ
HAYWARD, Cal.
6SI
BERKELEY, Cal.
6WL and 6JZ
ALAMEDA, Cal.
6AHN
PIEDMONT, Cal.
6HO
RICHMOND, Cal.
6BY
STOCKTON, Cal.
6SH
LODI, Cal.
(JS)
ACAMPO, Cal.
6PN
IONE, Cal.
6RJ
SACRAMENTO, Cal.
"SAC"
RENO, Nev.
6AV
?
?
PORTLAND, Ore.
KDP and 7JH
LACEY, Wash.
7YS
HOQUIAM, Wash.
7DJ
SEATTLE, Wash.
7BS
?

*****

REPORT OF TRUNK LINES.
"A," "E" and "G."

A final list of all Trunk Line and Branch Route stations is published in this report. The Routes are now in fair working order as outlined, and test msgs. have been discontinued. All the stations are asked and expected to be at work at the regular test msg. time, 10:15 p. m. Central time, on every Monday and Thursday. Regular msg. work will be handled at this time, and all the relay stations are urged to forward their relay business along regular lines, instead of shooting it about the country in haphazard fashion. We have worked hard to develop our Routes, and now that they are in working order, we should take advantage of them, to forward our msgs.

Route G through Iowa is now in working order, and from the way it has handled test msgs., bids fair to rival Route A in its eastern work. Route A west, is at last in working condition, due to the fact that 9IK and 9XN can now work directly. Msgs. can now be handled from the Atlantic to the Pacific along A. R. R. L. Routes. We consider this quite an achievement for our League, and we hope you will all take advantage of it for western msgs.

We have been asked to put our reports in a new form, and consequently your Manager presents the following:

Test msgs. of Nov. 6th and 9th were sent on time and o.k.'d by 9GY, 8NH and 9RP. These were forwarded along the Routes without trouble.

The msg. of the 16th was sent by 9IK and received by 8NH, who gave it to 5BV, as 9GY was unable to get it from 9IK, or 5BV. 5ZC got the msg. from 5BV and started the QSL back, but 9IK copied it directly from 5BV, while the latter was giving it to 9FW and 9GY.

On Nov. 20th, the msg. was copied by all of the three first stations, 9GY, 9RP and 8NH. 8NH attempted to send it east, but could not as none of the eastern stations were on the job. She was obliged to send her QSL to 9IK.

9GY forwarded the msg. to 5BV who gave it to 5ZC and a QSL was started back. 9IK copied it from 5ZC this time.

While all this was being done, Mr. K. B. Warner at 9FW, was chasing madly all over his town to buy a storage battery, or set of dry cells, to take the place of the one which "gave up the ghost" just as 9GY o. k.'d the msg. from 9IK. He got his cells and hooked them up in time to hear 9GY o. k. the QSL from 5BV. We call that rather tough.

After Nov. 20th, 9IK began sending on a 425 meter wave and could make no one climb up to listen for him, except 9RP who has copied all the test msgs. since his appointment. Later 8NH and 2AGJ and others were informed of the change in wave length at 9IK. Since then, work has been going on regularly, with the exception of a few nights in the early part of September, when the static was so bad that good work could not be done.

*****

Ralph H. G. Mathews 9IK

If we should only say that Mr. Mathews is a Trunk Line manager, you would probably know all about him without another word. Trunk Line Managers are very busy persons indeed. We don't know how Mr. Mathews possibly finds time to handle the Routes as efficiently as he does and at the same time find opportunities to operate 9IK. But the fact remains that he does operate and a large number of us from all over the country have heard his signals. We are all thankful that our League has such a wide-awake young man helping along our good work.

*****

CHANGES AND ADDITIONS IN THE ROUTES.

Mr. B. Emerson of Dallas, Tex. call 5DU has been appointed assistant to Mr. Corlett, 5ZC, also of Dallas.

Mr. J. O. Smith, 2LK, has been appointed New York Relay Station in the place of Mr. W. T. Feeney, 2IB.

Stations 9GY, 9IK, 2AGJ, 2LK, 1ZM and others are now equipped with the new Paragon regenerative receiving sets. Some exceptional receiving results are being obtained with it.

Special attention is called to the Route list appearing in this report. This line-up will probably be maintained the rest of the winter, although some changes may be necessary.

In order to determine when such changes should be made, all the Trunk and Branch Route stations are requested to send to the Chicago Manager's office, a written record of the test msg. handled during the preceding month. These records must be in by the 2nd of the following month to receive attention. In the record, it is desired that msg. be listed as below.

In this manner, a careful estimate of the traffic handled by each station can be made, and extra stations may intelligently be appointed where they are necessary.

Your Manager submits his Routes to you and hopes that you may all find them an improvement over the old system of hit-or-miss relay work. Suggestions for improvement are welcome at all times.

(Signed) R. H. C. MATTHEWS, 9IK
District Manager.

Msgs.	Origin	Destination	Forwarded via
3	New York City	Chicago, Ill	2LK, 2AGJ, 8NH, 9IK
1	Indianapolis	Boston, Mass.	9EG, 9WF, 8NH, 2AGJ

List of stations heard at station 9ZL, Louisville, Ill.

9ABD, 9HQ, 9IC, 9IP, 9YO, 9OQ, 9WO, 9GY, 9IK, 9DK, 9VY, 9HY, 9WC, 9RD, 9FP, 9XR, 9HJ, 9NN, 9UC, 9FW, 9AKP, 9CF, 9MQ, 9NW, 9LK, 9MY, 9ACM, 9ME, 8AEZ, 8NH, 8NF, 8JZ, 8JY, 8XA, 8CX, 8PA, 8CO, 8NY, 8ASG, 5ED, 5LA, 5ZS, 5ZS, 5ZC, 5DU, 5BB, 5BV.

Heard at 5BV, Little Rock, Ark.

9RD, 9NU, 9ABD, 9HQ, 9AAR, 9AWS, 9RJ, 9NN, 9TA, HB, 9EG, 9EM, 8OH, 8CS, 9FR, 9ME, 9QL, WS, 9AMI, 9WG, 9ACM, 8NH, 8AEZ, 9IK, 9AKL, 9VH, 9ZL, 9ON, 9JI, 8XA, 8CL, 9NW, 8AOF, 5BB, 9ADW, 9WF, 9DG, 9WI, 9AGH, 9WU, 9JS, 9YO, 8NF, 9PC, 9HX, 5AA, 9AIK, 5DU, 9LR, 9MR, 9PO, 9MK, 9HU, 9HO, 9QM, 9GY, 5ZC, 9AJ, 9VG, 9YO, 9DV, 9AAB, 9VP, 9ABM, 9DH, 9SI, GP 9GE, 9DB, 9BD, 5YG, 9FW, 5AX, 9AEV, 5AM, 5ED, 9EP, 9HS, 4CL, 4DG, 9VY, 9AW, 8LJ, 9GR, 9IC, 9ON, 9DK, 9BJ, 5FF, 8JG, 8JZ, 8JY, 9DK, 9NV, 9AEG, 9MQ, 9GJ, 9JW, 8CI, 9ACE, 9QF, 9AKP, 9GY.

Following is a list of stations heard by station 5ZC together with the ones worked during the period Nov. 1st to Nov. 29th 1916.

Stations worked in 5th District 5BV, 5YG, 5ED, 5BB.

Stations heard in 5th District 5CO, 5AX, 5AB, 5BT, 5ZM, 5AM, 5XO, 5CQ.

Stations worked in 8th District 8NH, 8AEZ.

Stations heard in the 8th District 8YO, 8JA, 8JZ, 8ACK, 8YL, 8KS, 8XA, 8AER.

Stations worked in 9th District 9YA, 9YO, 9NN, 9ABD, 9ZF, 9XN, 9IC, 9MQ, 9LR, 9TZ, 9HQ, 9HU.

Stations heard in 9th District 9EP, 9GY, 9WO, 9WH, 9GJ, 9GH, 9FW, 9DK, 9IK, 9OC, 9ZD, 9DB, 9CF, 9AIK, 9YS, 9TR, 9DM, 9JW, 9WR, 9NC, 9LT, 9LP, 9ZL, 9QF, 9AHR, 9BA, 9JJ, 9KB.

On November 29th 5:20 p. m. an hour before sunset heard 9YO and 9AIK, 9YO was calling 9YA.

Stations heard at 8NH during Nov.

1IZ, 1ZL, 1ZS, 2ABG, 2AGJ, 2BM, 2CE, 2DA, 2JD, 2JU, 2LK, 2OJ, 2PH, 2PM, 2YM, 2ZV, 3JE, 3UF, 3SZ, 3ZS, 4AA, 4AM, 4AP, 4CL, 4DD, 4DG, 4DI, 5AM, 5AP, 5AX, 5BB, 5BT, 5BV, 5CO, 5DU, 5ED, 5YG, 5ZC, 5ZM, 5ZS, 8AAK, 8ACM, 8AEH, 8AFE, 8AIM, 8AIR, 8AKK, 8AKM, 8AM, 8AMG, 8AOI, 8AOM, 8AOR, 8CL, 8CO, 8CS, 8ED, 8IR, 8JA, 8JG, 8JY, 8OX, 8JZ, 8KF, 8KS, 8NF, 8NQ, 8NV, 8OU, 8QB, 8QK, 8SK, 8VJ, 8VP, 8VX, 8XA, 9AAB, 9AAK, 9AAS, 9ABD, 9ACO, 9ACS, 9AEG, 9AFE, 9AGB, 9AIK, 9AKP, 9AKW, 9AMI, 9AU, 9AW, 9BC, 9BJ, 9CF, 9DC, 9DK, 9DM, 9EG, 9FW, 9GJ, 9GR, 9GY, 9HQ, 9HU, 9HX, 9IC, 9IK, 9JB, 9JI, 9JO, 9JW, 9JX, 9KU, 9KV, 9LP, 9LR, 9LT, 9ME, 9MK, 9MQ, 9NN, 9NU, 9NW, 9ON, 9PF, 9PI, 9QF, 9RD, 9RP, 9RW, 9SD, 9SP, 9SJ, 9TR, 9UC, 9VG, 9VP, 9WC, 9WG, 9WO, 9WW, 9XN, 9YA, 9YF, 9YG, 9YO, 9ZI, 9ZL, SN (Lincoln, Nebr.), WPP (Wilmington, Del.)

November list of stations heard at 9IK, Chicago, Ill.

9ABD, 9GY, 8AAK, 2LK, 9NU, 9RP, 9VK, 9WF, 9GJ, 5BV, 5AX, 5ZC, 5ED, 9MQ, 9EP, 9SP, 9DB, 9AIM, 9DS, 9SD, 2AGJ, 2PM, 9VY, 4CL, 9XN, 8JA, 8XA, 1ZV, 9ZD, 8AEZ, 9PC, 9NN, 9CF, 9LQ, 9AKP, 8AEH, 9YI, 9AIW, 8NF, 9VP, 9AMI, 2JU, 5DU; 8AEQ, 3RO, 8YL, 8YO, 9RD, 9LR, 8AOI, 9HQ, 9WO, 9NW, 9ACM, 9IC, 9XH, 9PI, 8JZ

Stations over 200 miles who report hearing 9IK.

9ABD, 9GY, 8NH, 9NU, 2LK, 9RP, 9VK, 9WF, 9GJ, 5BV, 5ED, 9MQ, 9DB, 2AGJ, 2PM, 9XN, 8JA, 8AEZ, 9YI, 9VP, 9RD, 9XM, 8JZ, 5AB, 1ZF, 1DX, 9ZL, 5ZC.

On the morning of November 25th, communication was carried on with station 8NH at St. Marys, Ohio, and four messages were received from that station without difficulty, when Mrs. Candler at 8NH was using a three-inch spark

coil, or a twenty volt step-down transformer, with no vibrator. The coil was connected to the same leads as the Thordarson transformer which is regularly used, without change of condenser or tuner. We claim that is a record of which Mrs. Candler can feel proud. She informs us that using the same coil she has worked several eastern stations, including 2AGJ, at Albany. A little thing like a burnt out transformer can't keep a good "man" down.

Mr. L. A. Kern, of 9GY, reports that he has been informed that he is heard at San Diego, California, by station 6SR, a distance of about 1,600 miles. Mr. Kern uses a 550 watt transmitter.

Route A With All Branches.

CAMBRIDGE, Mass
1LE, Harvard University
FALL RIVER, Mass.
1ZF H. C. Bowen

Branch No. 8

NEW BEDFORD, Mass.
1ZN

Branch No. 9

CUTTYHUNK, Mass.
1KV

Branch No. 10

TAUNTON, Mass.
1EC

Branch No. 11

ATTLEBORO, Mass.
1ABS

Branch No. 12

PROVIDENCE, R. I.
1AEM

Branch No. 13

LAKEWOOD, R. I.
1BT

Branch No. 14

PAWTUCKET, R. I.
1TU

Branch No. 15

NEWPORT, R. I.
1TI
NORTHAMPTON, Mass.
1ZL D. R. Lewis
VALLEY STREAM, L. I. (N. Y. City)
2LK J. O. Smith
ALBANY, N. Y.
2AGJ J. K. Hewitt
ROCHESTER, Pa.
8JX L. H. McCandless
CLEVELAND, O.
8JZ A. J. Manning
ST. MARYS, Ohio
8NH Mrs. Chas. Candler

Branch No. 16

TOLEDO, O. & Michigan points,
8ZL
DETROIT, Mich.
8AIR

Branch No. 17

FT. WAYNE, Ind.
9WF

Branch No. 18

INDIANAPOLIS, Ind.
9JI & 9EG

Branch No. 19

CINCINNATI, O.
8ACK

Branch No. 20

COLUMBUS, O.
8IK & 8YO
NEWARK, O.
8ARE

Branch No. 30

ANN ARBOR, Mich
8XA

Branch No. 31

NORWOOD, O.
8ACK
*CHICAGO, Ill.
9IK R. H. G. Mathews

Branch No. 1

KENOSHA, Wis.
9VK H. Boardman
MILWAUKEE, Wis.
9ADL C. Bates
SHEBOYGAN, Wis.
9RW

Branch No. 2

TRAVERSE CITY, Mich.
8AOI C. Curtiss

Delete Branch No. 3

Branch No. 4

MAYWOOD, Ill.
9AU R. Iverson

Branch No. 5

GARY, Ind.

Msgs.	Origin	Destination	Forwarded via
3	New York City	Chicago, Ill	2LK, 2AGJ, 8NH, 9IK
1	Indianapolis	Boston, Mass.	9EG, 9WF, 8NH, 2AGJ

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Heard at 5BV, Little Rock, Ark.

9RD, 9NU, 9ABD, 9HQ, 9AAR, 9AWS, 9RJ, 9NN, 9TA, HB, 9EG, 9EM, 8OH, 8CS, 9FR, 9ME, 9QL, WS, 9AMI, 9WG, 9ACM, 8NH, 8AEZ, 9IK, 9AKL, 9VH, 9ZL, 9ON, 9JI, 8XA, 8CL, 9NW, 8AOF, 5BB, 9ADW, 9WF, 9DG, 9WI, 9AGH, 9WU, 9JS, 9YO, 8NF, 9PC, 9HX, 5AA, 9AIK, 5DU, 9LR, 9MR, 9PO, 9MK, 9HU, 9HO, 9QM, 9GY, 5ZC, 9AJ, 9VG, 9YO, 9DV, 9AAB, 9VP, 9ABM, 9DH, 9SI, GP 9GE, 9DB, 9BD, 5YG, 9FW, 5AX, 9AEV, 5AM, 5ED, 9EP, 9HS, 4CL, 4DG, 9VY, 9AW, 8LJ, 9GR, 9IC, 9ON, 9DK, 9BJ, 5FF, 8JG, 8JZ, 8JY, 9DK, 9NV, 9AEG, 9MQ, 9GJ, 9JW, 8CI, 9ACE, 9QF, 9AKP, 9GY.

Following is a list of stations heard by station 5ZC together with the ones worked during the period Nov. 1st to Nov. 29th 1916.

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Stations heard in 5th District 5CO, 5AX, 5AB, 5BT, 5ZM, 5AM, 5XQ, 5CQ.

Stations worked in 8th District 8NH, 8AEZ.

Stations heard in the 8th District 8YO, 8JA, 8JZ, 8ACK, 8YL, 8KS, 8XA, 8AER.

Stations worked in 9th District 9YA, 9YO, 9NN, 9ABD, 9ZF, 9XN, 9IC, 9MQ, 9LR, 9TZ, 9HQ, 9HU.

Stations heard in 9th District 9EP, 9GY, 9WO, 9WH, 9GJ, 9GH, 9FW, 9DK, 9IK, 9OC, 9ZD, 9DB, 9CF, 9AIK, 9YS, 9TR, 9DM, 9JW, 9WR, 9NC, 9LT, 9LP, 9ZL, 9QF, 9AHR, 9BA, 9JJ, 9KB.

On November 29th 5:20 p. m. an hour before sunset heard 9YO and 9AIK, 9YO was calling 9YA.

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November list of stations heard at 9IK, Chicago, Ill.

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Stations over 200 miles who report hearing 9IK.

9ABD, 9GY, 8NH, 9NU, 2LK, 9RP, 9VK, 9WF, 9GJ, 5BV, 5ED, 9MQ, 9DB, 2AGJ, 2PM, 9XN, 8JA, 8AEZ, 9YI, 9VP, 9RD, 9XM, 8JZ, 5AB, 1ZF, 1DX, 9ZL, 5ZC.

On the morning of November 25th, communication was carried on with station 8NH at St. Marys, Ohio, and four messages were received from that station without difficulty, when Mrs. Candler at 8NH was using a three-inch spark

coil, or a twenty volt step-down transformer, with no vibrator. The coil was connected to the same leads as the Thordarson transformer which is regularly used, without change of condenser or tuner. We claim that is a record of which Mrs. Candler can feel proud. She informs us that using the same coil she has worked several eastern stations, including 2AGJ, at Albany. A little thing like a burnt out transformer can't keep a good "man" down.

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Route A With All Branches.

CAMBRIDGE, Mass
1LE, Harvard University
FALL RIVER, Mass.
1ZF H. C. Bowen

Branch No. 8

NEW BEDFORD, Mass.
1ZN

Branch No. 9

CUTTYHUNK, Mass.
1KV

Branch No. 10

TAUNTON, Mass.
1EC

Branch No. 11

ATTLEBORO, Mass.
1ABS

Branch No. 12

PROVIDENCE, R. I.
1AEM

Branch No. 13

LAKEWOOD, R. I.
1BT

Branch No. 14

PAWTUCKET, R. I.
1TU

Branch No. 15

NEWPORT, R. I.
1TI
NORTHAMPTON, Mass.
1ZL D. R. Lewis
VALLEY STREAM, L. I. (N. Y. City)
2LK J. O. Smith
ALBANY, N. Y.
2AGJ J. K. Hewitt
ROCHESTER, Pa.
8JX L. H. McCandless
CLEVELAND, O.
8JZ A. J. Manning
ST. MARYS, Ohio
8NH Mrs. Chas. Candler

Branch No. 16

TOLEDO, O. & Michigan points,
8ZL
DETROIT, Mich.
8AIR

Branch No. 17

FT. WAYNE, Ind.
9WF

Branch No. 18

INDIANAPOLIS, Ind.
9JI & 9EG

Branch No. 19

CINCINNATI, O.
8ACK

Branch No. 20

COLUMBUS, O.
8IK & 8YO
NEWARK, O.
8ARE

Branch No. 30

ANN ARBOR, Mich
8XA

Branch No. 31

NORWOOD, O.
8ACK
*CHICAGO, Ill.
9IK R. H. G. Mathews

Branch No. 1

KENOSHA, Wis.
9VK H. Boardman
MILWAUKEE, Wis.
9ADL C. Bates
SHEBOYGAN, Wis.
9RW

Branch No. 2

TRAVERSE CITY, Mich.
8AOI C. Curtiss

Delete Branch No. 3

Branch No. 4

MAYWOOD, Ill.
9AU R. Iverson

Branch No. 5

GARY, Ind.

9AAB P. H. West

Branch No. 21

ST. LOUIS, Mo.
9GJ E. N. Levander & B. Lydnick
JEFFERSON CITY, Mo.
9ABD W. P. Corwin
KANSAS CITY, Mo.
9MQ A. L. Graham
*GRAND FORKS, N. D.
9XN University of N. D.
and
*FARGO, N. D.
9YG N. D. Agricultural University
*LEWINSTOWN, Mont.
7ZC A. C. Campbell

Branch No. 22

BOZEMAN, Mont.
7ZD E. Dawes
*LA GRANDE, Ore.
7ZH O. M. Heacock
*LACEY, Wash.
7YS
*HOQUIAM, Wash.
7DJ

Route E

*CHICAGO, Ill.
9IK R. H. G. Mathews
Branches given under route A list
*MATTOON, Ill.
9GY L. A. Kern

Branch No. 7

DECATUR, Ill.
9NW W. R. Caldwell
SPRINGFIELD, Ill.
9AGN F. L. Brittin
*LOUISVILLE, Ill.
9ZL C. Bridges

Branch No. 6

BELLEVILLE, Ill.
9FR
E. ST. LOUIS, Ill.
9QZ
GRANITE CITY, Ill.
9IU
ST. LOUIS, Mo.
9VP
*CAPE GIRARDEAU,, Mo.
9NN H. B. Deal
and
*MOUND CITY, Ill.
9FW K. B. Warner

*LITTLE ROCK, Ark.
5BV J. M. Clayton
*DALLAS, Tex.
5ZC F. M. Corlett
5DU B. Emerson

Branch No. 23

FT. WORTH, Tex.

Branch No. 24

WACO, Tex.
5YG Waco High School
TEMPLE, Tex.

Branch No. 25

CORSICANA, Tex.
DF Roy Layton

Branch No. 26

GROESBECK, Tex.

Branch No. 27

MC ALLEN, Tex.
*HOUSTON, Tex.
5ED J. L. Autry, Jr.

Branch No. 28

SHREVEPORT, La.
5ZS W. E. Anthony
5AX D. R. Simmons

Branch No. 29

HOUSE, Tex.
D. H. Graham

Route G

*CHICAGO, Ill.
9IK R. H. G. Mathews
Branch routes given under route A list.
*ROCKFORD, Ill.
9RP R. Graf
*CLINTON, Ill.
9RD D. I. Bailey
IOWA CITY, Ia.
9YA University of Iowa
*AMES, Iowa
9YI Iowa State College
ELDORA, Iowa
9ZI D. R. Lewis
*LAMONI, Iowa
9YO Graceland College
*OMAHA, Neb.
9BW William Rheinhardt
*LINCOLN, Neb.
9YJ Univ. of Lincoln
*DENVER, Colo.
KIX William H. Smith

(Trunk Line Stations Marked *)

REPORT OF TRUNK LINES "C" AND "D"

A. A. Hebert, Manager.

It is with pleasure that your Manager has to report that communication is being carried on between Washington (3 ZW) and this section through "2 LK." During the past month communication was established between Danville, Va. (3 RO) and New York City (2 JD).

Development of Stations on Line "D" is very slow, but local relay work is being done by practically all stations. On line "C" good work is being done by Baltimore stations through "3AK" and it is now felt that communication between Philadelphia and Washington will be established before this report goes to press. Stations between Philadelphia and Washington should get in touch with "3 SD" and "3 ATR," as well as Mr. E. B. Duvall (3 AK) and help them out as much as possible.

As advised in the last report, regular weekly test messages have been discontinued, but in place we will inaugurate reports on traffic handled by all members, and, effective at once, please send to your Manager every week a card showing the total number of messages handled, and also the calls of the different stations with whom the traffic has been handled.

During the last week of November "3WN" received 24 messages from and sent 23 to "3 AFA," and one message sent in the day time to "3 ED." "3 OJ" handled eight messages and worked with "1 IZ" "3 AFA" - 46 messages in ten days. Worked with "1 ZL" and other stations.

"2ABG" handled 76 messages during November and worked with 8AEZ, 2AGJ, 8VX, 8ED, 8JA, 2DA, 2CE, 2VS, 2JN, 3WN, 2LK, 2ML.

"2 LK" handled 110 messages during the month and worked with 2BO, 2AGJ, 2RL, 2ZE, 8VX, 3WN, 2ABD, 9GY, 1ZD, 2IB, 8AEZ, 9IK, 2AIZ, 2FS, 2ABG, 9GJ, 8CO, 2ZP, 3AEP, 2IF.

To the list of Star Relay Stations published in October should be added "2 ZP." There are two or three more to be passed upon and if their record can be verified names will be given in a future issue.

It is gratifying to your Manager to see the efforts being made by all our members to make their stations efficient, and it will give me pleasure to answer by mail any questions which members on Trunks "C" and "D" may ask me.

A. A. Hebert,
246 Highfield Lane,
Nutley, N. J. 2 ZH

Our good President Mr. Maxim, called on me recently, and we want to keep our weather eye on him, as he has a great many things in store for the future which will interest all of us.

Rotten QRM

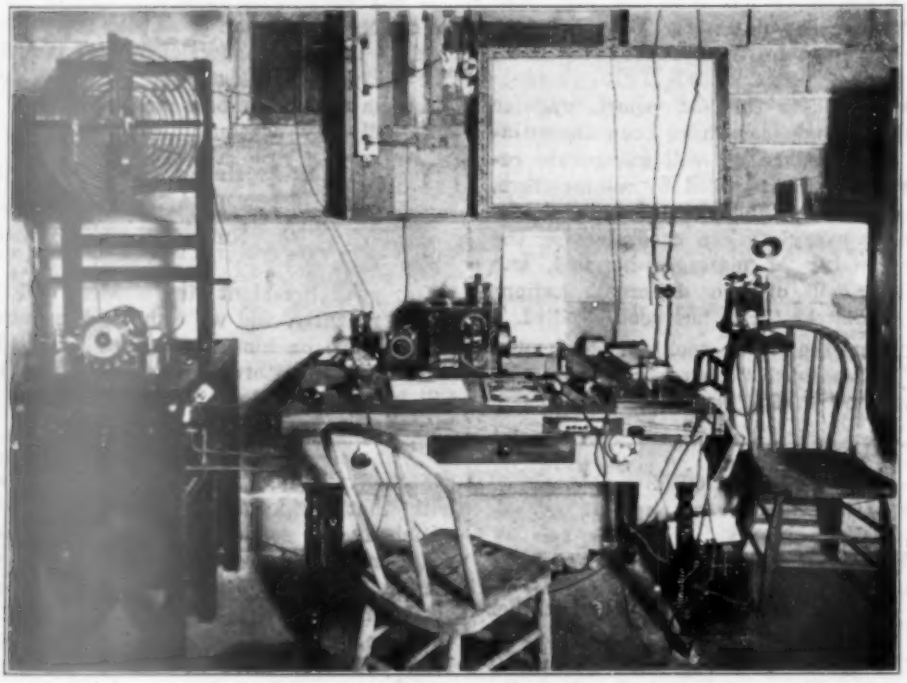
(Continued from page 27)

twenty-four hours have the boy arrested and sentenced to life imprisonment, we will all band together and find another job for said Radio Inspector. Let us rise, fellow bugs. Rise and crush this octopus which is engulfing and overwhelming us. Eight hours a day and triple time for overtime is death and starvation to our families. Hash for breakfast, rotten smelling fish, and QRM — — —We will have naught of it. Down with the fellow with the scratchy spark coil, down with the fellow who calls three times three, down with the fellow who calls everybody he hears and **down down down** with that unspeakable skunk who calls somebody and sends a long relay message repeating each word three times when the station to which he is sending is sending something himself.

There, by heck, I have that off my chest. Now you over there in Illinois, get this call. Let everybody else stand back from now on. I'm tired and sleepy and cross, and I don't care who I QRM until I get that pin cleared off.

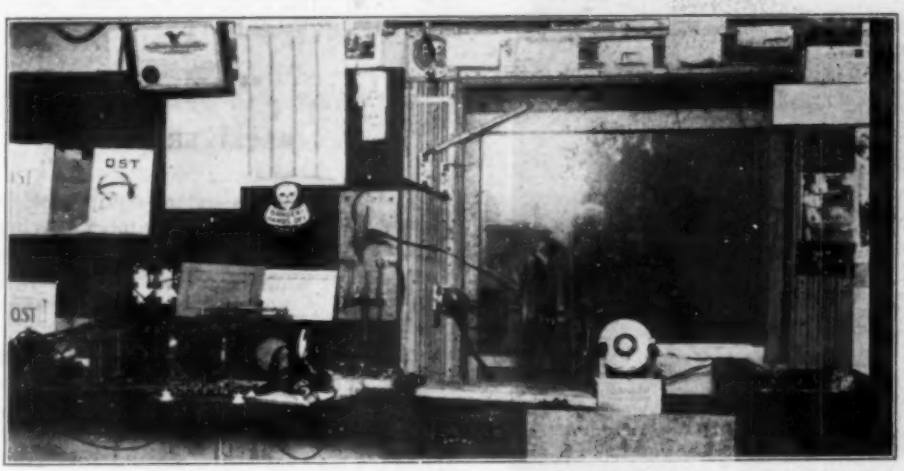
The Old Man

A Radio Set In St. John, Kansas



The outfit owned by Don I. Shepherd of St. John, Kansas, is shown in the picture. Call letters are 9BG. The sending unit consists of a 1 Kw. Cos-Radio panel design. The receiving set is of the same make. The sending range is about 1,000 miles having been heard as far as Boise, Idaho. For receiving, all the larger stations of the United States have been copied. Darien, Panama, is heard with ease. The rest of the apparatus speaks for itself.

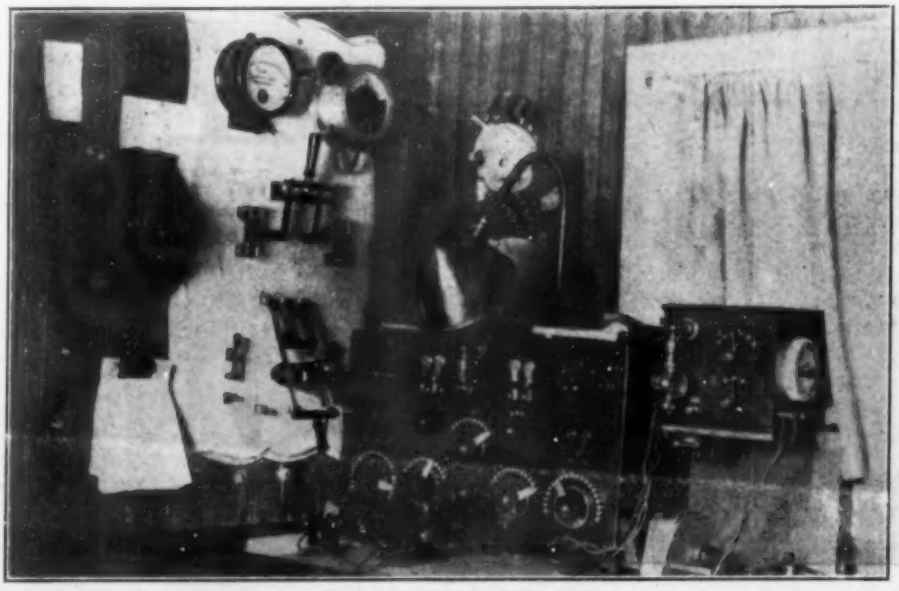
Radio Station 6AU



The photo herewith is of the radio station owned by Mr. Paul U. Clark of San Jose, Cal. A five Kw. transformer, cut down to a 1 Kw. input is used for transmitting in connection with rotary gap, pancake type oscillation transformer and oil immersed condenser. The receiving set is the regular audion type with two couplers for short and long waves, up to 6,000 meters. The station was quite successful in long distance work last winter, using galena at that time, the audion shown being a recent addition from which great results are anticipated.

One of Our Stations at Poughkeepsie

DESCRIPTION ON FOLLOWING PAGE



A neat outfit is shown in the accompanying pictures. This outfit is owned by Arthur H. Winn who has been in our League for some time. With the set shown, he has copied and worked 1IZ, 2BM, 2AGJ, 2ZP, 2XA, 2IB, 2CE, 2ABG, 3NB, 8XE, 8ZW, 8IF, 8VY, and 8YL.

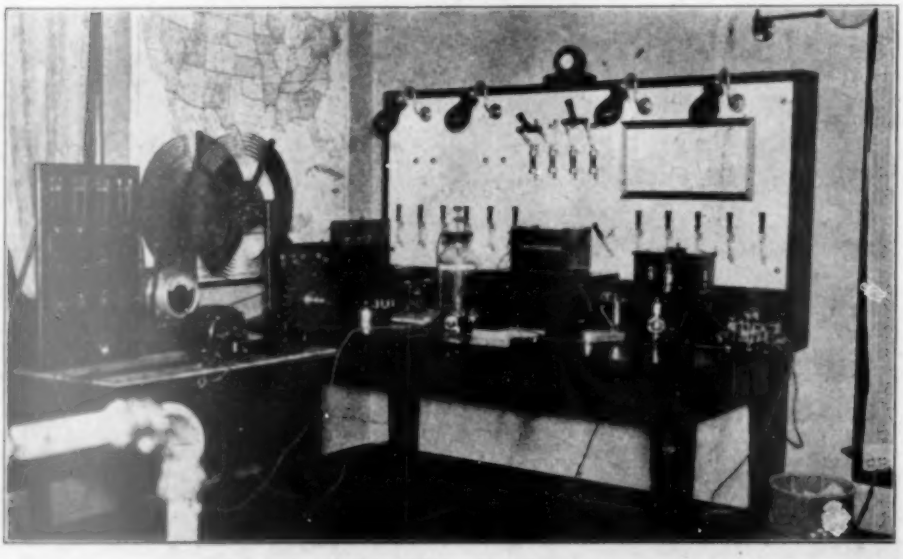
*****

RECEIVER

The following receiving equipment is used: Cabinet type loose coupler, having hard rubber tubes; variable condenser; loading coil; audions, Navy type phones, 3200 ohms.

With this station many ships may be read 25 feet from the phones. NAA and NAR can be plainly heard at 50 feet and NUJ at 100 feet. Many long distance amateurs may be heard several feet from the phones, but it is impossible to read the weaker stations on account of inductance from near-by arc and telephone lines. Signals from the stations have been heard up to 650 miles; greater distances are expected. Anyone at a considerable distance hearing 9MQ will confer a favor by sending card to Albert I. Graham, 3033 Park Avenue, Kansas City, Mo.

Station 9MQ



DESCRIPTION ON FOLLOWING PAGE

A. R. R. L. station on Trunk Line B, owned by Albert I. Graham of Kansas City, Mo., is shown in the pictures. This station has done some very efficient work and the data will prove of great interest.

*****

AERIAL MAST AND AERIALS.

The aerials are supported by a steel tower 75 feet high, on top of which is mounted an iron pipe, (15 feet) giving a total height of 90 feet. The entire structure weighs about 4,000 pounds and is self-supporting. The aerials consist of three single wires, 150, 250 and 350 feet long respectively. A four-wire aerial, 75 feet long and 90 feet high. The last named makes a very efficient short wave aerial.

*****

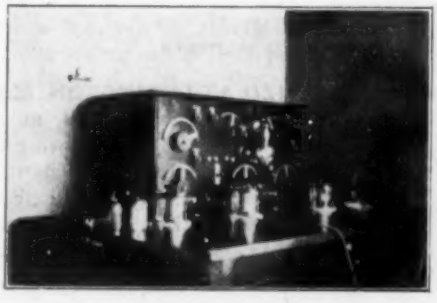
TRANSMITTER.

The transmitting set is composed of the following instruments: One Kw. type E Clapp-Eastham transformer oscillated on city current; a variable glass plate condenser in oil; a rotary gap having 24 teeth and four stationary electrodes, and driven by eighth horse power motor to give a 300 cycle note; oscillation transformer having six primary turns and twelve secondary turns of ¾ inch brass ribbon on a fibre frame.

Wireless key, Vibroplex, extra heavy relay with break-in system, C. E. Co. hot-wire ammeter and C. E. Co. wave meter complete the transmitter. Connections are made with braided ribbon and are but eighteen inches long in the oscillating circuit.

The Outfit of 1UN

This outfit at 1UN is of the cabinet type with a 5,000 meter loose coupler fitted with dead-end switches so it works well on 200 meters. Audion circuits for spark or arc signals. The following amateurs have been heard during the last few weeks: 8AEZ, 8CO, 8NH, 8YO, 8VY, 2AGJ, 2BM, 2CE, 2DA, 2FR, 2PM, stations from NAB to NAX have been copied and the Commercials from VCE to WST and WPD.



Radio Communications by the Amateurs

WIRELESS AMATEURS.

Mr. C. D. Tuska,
Hartford, Conn.

Dear Sir:

I have a troubled conscience and wish to confess. It was not, as Mr. E. C. Andrews in the June issue said, "the spirit of unselfishness" that prompted me to mail a card to stations that I heard. On the card I gave a description of my set and asked for a brief description of their set in return, hoping to receive pointers so I could improve my set, which I am doing.

Not all the cards were answered, but I think it was because the addresses given in the 1915 call book were incorrect, as some of the fellows are quitting the game and their calls are assigned to others.

Perhaps this is why Mr. J. O. Smith (2LK) received no answers to his cards. I cannot imagine a wireless amateur so inconsiderate. Have you ever been approached by a man who said "I am a Mason" or "I am an Odd Fellow" or "I am a wireless Enthusiast." Which one received the broadest smile and the heartiest handshake? My son says, "Well you know the Wireless Bug is not going to touch you for a dime."

Our "QST" is certainly growing. With best wishes,

Yours very truly,

WM. T. FRASER 8VX

*****

HEARD BY 1ZD AT LEXINGTON, MASS.

S. W. Dean, operator of 1ZD, at Lexington, Mass., has heard the following calls and wishes to make dates with distant stations as traffic in his vicinity is all tied up.

2LK, 2AGJ, 2QB, 2ZV, 2IM, 3FR, 8NH, 8YO, 8YL, 8YI, 8AEZ, 8CO, 8JA, 9PC, and 9VY.

A Long Quick One.

2LK, J. O. Smith, Valley Stream, L. I., N. Y., reports a quick handling of a long distant message on Saturday night, December 2nd. He has just connected in one of the new Godley Paragon RA6 receiving sets, and heard 9GY, Kern, Mattoon, Ills., who had a message for him. He took the message and found that 5DU, Emerson, Dallas, Tex., had just sent it to 9GY.

Here is a message from Dallas, Texas which landed in New York by one relay only at Mattoon, Ills., and was handled about as quickly as the highly organized land wires could have handled it. Just a preliminary to some of the things which the future has in store for us.

*****

AMATEUR WORK IN MEXICO

Puebla, Mexico.

Dear Editor:

I have the pleasure of informing you that on the night of November 16th, at 9:52 p. m., Puebla Time, which is about 11:24 Arlington Time, I heard the amateur F. M. Corlett, 5ZC, calling 5ED and 5AX. The signals were clear and strong and as the distance between Dallas, Texas, and Puebla, Mexico, is more than 1,500 kilometers (900 miles), I think Mr. F. M. Corlett will be pleased to know that I can hear him here in Puebla, Mexico.

I have not the address of Mr. Corlett and for this reason, I do not write him. Will you be so kind as to let him know that I can hear him? I should like to know what class of instruments he uses to transmit, power and wave length.

On the night of November 19th at 2:26 a. m., Puebla Time, 98th Meridian, I heard 5DU also. I do not know who has these call letters. I am a subscriber to QST.

Thanking you for your kindness, I remain,

Yours truly,

(Sgd) GUILEBALDO T. RANGEL.

*****

COMMERCIALS HEAR AMATEURS

S. S. Elvalle, Galveston, Texas, Operator David L. Cawman.

I thought I would write and let you know of the amateur stations I have heard using a crystal detector. I am a commercial operator on board the ship, but a strong amateur when at home. My run is between New York and Galveston, Texas. I have copied several amateurs at what I consider a good distance, without using an audion.

On this trip South, at 10:35 p. m., while crossing the Gulf of Mexico, I copied 8AEZ while working 8NH. We were then 1,075 miles from 8AEZ. A few minutes later, I heard 9MQ at Kansas City Mo., distance, 1,000 miles. 9ABD, 9AKP, 9WF, 9YA, 5AM, 5BV, 5ZC, 5ZM, 5ZS, and 8YO were all heard the same evening. They were all readable and none of the above were less than 700 miles from us. Last night at the dock in Galveston I copied the following: 8AEZ, working 3RO, 9ABD, strong, as 5ED, 5BV, and 9MQ. Several others were heard, but too faint to read through QRM.

I am operating a one Kw. open core United Wireless Transformer, copper coated condenser jars, Murdock rotary gap, pancake oscillation transformer, for sending at my home station. For receiving, I am using audions. I shall try to get in the relay business if I can, but I am only home about five days at a time.

I am using two small coils for receiving, two variable condensers, and an audion for 200 meter work. This method was shown to me by a Government Inspector and brings in signals from 200 to 400 meters stronger than a loose coupler. The two coils are made for the primary and secondary, the same as a loose coupler, only both coils can be the same size. They are fixed and no taps taken off either coil. There is a Murdock variable condenser in series with the aerial and another shunted across the secondary. The tuning is done with the two condensers entirely. This does away with a great amount of resistance in taps and it is a great device for short wave work. The coils are both very small and can be put on the table side by side so you can move one from the other and get the right coupling; then all the tuning is done with the condensers.

*****

HERE'S ONE ABOUT US

St. Louis, Mo.

Editor QST,
Hartford, Conn.

Dear Eddy:

I call you Eddy because I always call my friends by nicknames, and I call you a friend because I have just lately received my first copy of QST. I want to say right here that it is "some book" and you deserve great credit. It goes right to the hearts of the amateurs. Excuse this pencil but I am sitting with the phones on and doing a little listening. Right this minute I hear 9FW talking about relay route B. He comes in pretty well, too. (There goes that little devil in the next block). Sometimes I think I'll quit wireless or get up a gang and go around tearing down aerials for a few hours each evening.

Now I hear WUJ " talking" to 5BV. Something new. 5BV and 5DU surely cause some QRM here. They come in as if they were only 50 miles away. On nothing but a coupler and single audion, I have copied the following tonight:

2AGJ, 5BV, 5DU, 5ZC, 5ZD, 8CL, 8CS, 8JK, 8OH, 9EN, 9HO, 9IC, 9LW, 9NW, 9YO, and about thirty others. They all are easily readable.

Believe me, "Eddy," there is nothing on earth like sitting out here in my "lil" radio shack with a nice fire in the old stove and the old corn-cob pipe going and listening to the distant ones coming in. Come to think of it, tho, I believe I enjoy reading QST as much as the distance. Every time my ears begin to ache, I turn off the audion and read the next page of our magazine.

I have a half Kw. Thordarson (excuse me till I QRU 9LT) with five sections of

Murdock condenser and radiate 2.6 amps. Pretty fair for a half, eh, Eddy? If anyone has ever heard 9HS, I will be more than pleased to have 'em drop me a line. 9AH in Call Book. Well, Eddy, OM, the QRM is getting less so guess I'll gv em a e. q. so cul and say rush that next issue a lil, will u?

Yours truly,

BILL (W. E. Woods,
4538 Laclede Ave.,)

*****

Conewango, N. Y.

Dear Mr. President:

Answering your letter, I am sorry to say I shall be unable to make another test for about a week. You heard my one Kw. and just afterwards I burnt the secondary out and Clapp-Eastham have not yet sent me a new one. In making the next test, I suggest 7:00 p. m., instead of 8:30 as the Commercial stations are busy, thus the near-by ones drown out distant stations on short wave lengths.

Using Brandes phones, DeForest Ultraaudion, Blitzen variable, and a 2500 meter loose coupler, I have heard the following stations:

1ZL, 1ZM, 8AA, 8ACK, 8AG, 8ALE, 8AR, 8ED, 8EK, 8EN, 8CO, 8GN, 8NH, 8HK, 8NA, 8GJ, 8IL, 8LH, 8OW, 8PH, 8SK, 8VB, 9WG, 8WP, 8SY, 8VD, 8ZW, 8XE, 8YC, 9NN, 9PC.

I wish to congratulate you on QST. It has distinguished itself by becoming the chief amateur magazine. I am sure no real amateur could get along without it, after once reading it.

Very truly yours,

(Sgd) MAYNARD W. PHILLIPS.

*****

OUR LEAGUE.

Two years ago when I joined the League its membership was extremely small; worse than that, its financial standing was far below normal, not even mentioned by Bradstreet or Dunn. Things are changed now; our membership is large, we are normal financially, and we have ben recognized by the Government as an institution which will assist it. We have our imitators, naturally,—many of them, but when all is done, "and the goose cooked," so to speak, it can be traced back to the American Radio Relay League, the originators of the great idea. It was through us the idea took root and grew.

At the time I joined the League, I was greatly enthused by the idea. California then was represented by very few members. About then, the Panama Pacific Exposition was held. I naturally thought of advertising the League by installing an exhibit booth of the Associated Amateurs of the State.

This was to show their workmanship and let the public at large know what the amateur is capable of doing. The proposition was put up to the foremost and best radio club in California and as nothing was done in regard to the idea, I let things slide. At that time, the League was laughed at and on many occasions I was told it was only a money-making proposition and that it would go up and be forgotten before long. The very ones who told me all this are now members of the League. I wonder why they joined?

I received notice from the Government office that at the suggestion of the American Radio Relay League, a test would be held with the amateurs this coming Saturday night to test their ability as operators. Point Loma has just finished with the test and now Goat Island is going to hold one. This looks as if the League was doing something, doesn't it? At the present time we have Trunk Line F working as far as possible. Seefred Brothers are doing their share. QRM after 10:00 p. m. will have to be regulated much better if relay work is to be done with any results. When you consider me trying to work Los Angeles at 10:30 p. m., and having several amateurs talking at that late hour and trying to work through them using an audion, you have some idea of what is **not** possible.

TAKE NOTICE PLEASE—Because of the interference from "hams" working with others across the street and around the corner, or working "daylight stuff," long distance work between Los Angeles and the San Francisco Bay District is com-

pletely cut off until about 11:30 p. m., when we might be able to get a word in sideways. These QRMers are twenty miles away. During the last week, I have kept tabs on QRM. It is impossible to work Los Angeles at any time up to Midnight, just because a few hog the air for unnecessary stuff. SOMETHING MUST BE DONE.

Aren't the ones with small power willing to give up a few hours, say twice a week? If we could shut up "hamming" after 10:00 p. m. twice a week, it would be fine. I am afraid this is the only way we can accomplish anything out here. In a few weeks, I shall send you detailed information concerning the QRM in this District and also a QRM map which will make things clearer.

This is a sample of the test message sent out by 6EA, Seefred Brothers, on our Trunk Line F, every Sunday and Thursday evenings at 10:15 p. m.

Hr msg No. 1 ck 9 radio Los Angeles filed 10:15 p. m. 23rd. To Relayers; Knock the skiddoo out of 23rd.

Sig. Seefred Brothers.

Signals clear and QSA, weather fair, thermometer forty-eight degrees, QRM medium.—L. Hoyt.

LEANDER L. HOYT,
Hayward, Cal.

*****

QTA QTA QTA

Here is an answer from one of our dear friends who wishes to help out the victim of "Rottenest Luck Ever." He gives the answer to the query in the November QST by EL Amateur.

Red yur artikle in QST aboute yur roten luck and bein an old frend i thot id trigh to hellup u sow that is whigh i be ritin this ansure.

u ask whigh a powl 110 feat hi with no 12 guiy wighres hitched to dead men forghty feat awa, wighl noght stay up with maddam. natoor working gainst it. frum the way u writ it in QST u semed to have onli wun set of gi wighres and thease u sayed were at the top.

if u had av taken sum mohr gis offen the powl nere the middul of the powl mite av ben a difrunt tail.

now bruthr i adviz u tu work and git yur stahf up afore snoghs ef u wanna hev ani fughn this here summer.

yur fren
jawn

*****

HEARD AT FALL RIVER, MASS.

I believe it is a fine idea to publish in our "QST" the different amateurs that we hear from long distances. The following is a list of stations that I have heard very recently farther than fifty miles; IZH, ILE, IWZ, IVN, 2AMD, 2RL, 2ZE, 2IB, 2AGJ, 2DA, 2PH, 2WT, 2PM, 3CH, 4CL, 8NH, 8NE, 8OH, 8CS, 8AEZ, 8AE, 8YO, 8AOF, 8VP, 8NQ, 8NG, 8JX, 8JK, 8CO, 8AIM, 8SX, 8JZ, 8JY, 8BE, 8IJ, 8AAK, 8JA, 8AOR, 8UT, 9VY, 9NU, 9EG, 9GU, 8ACA, 9ACV, 9XE, 9JZ, 9JI, 9TA, 9HQ, 9AEU, 9IK, 9ABD, 9ON, 9AKP. Of these 9AEU, Sioux City, Iowa, is my record, being about fourteen hundred miles.

The fact that I do not hear more from my own district leads me to believe that the sending conditions in this section of New England are not nearly as good as they are farther west. Many a time a station out in Illinois has drowned out a station of similar power fifty miles away.

As the list shows, I am having the same excellent results as our president with a short wave, regenerative set.

To my mind every department of "QST" is beyond criticism. Hoping it further success, I am

Yours very truly,
HAROLD C. BOWEN, IZF.

*****

HEARD BY 8NF.

Battle Creek, Mich.

Mr. H. P. Maxim, Pres.

Dear Sir:

I see that u collected some of my receiving difficulties, according to "QST." I sure had them as I was troubled by 60 cycle line induction, and a commutator motor sing of abt 500 cycle tone as well as street car stuff, to say nothing of jam-

ming of amateurs, of whom I could hear at least a dozen almost any time. I found it a failure to work any long distance before eleven.

Here is a list of calls that I heard between Oct. 1st and Nov. 1st.; 8YO, 8AAK, 8AEZ, 8CH, 8CS, 8YP, 8JP 8EC, 8VX, 8AOA, 8ACF, 8GK, 8KS, 8NH, 8JK, 8JX, 8LT, 8XB, 8KF, 8AAB, 8RH, 8JZ, 8KI, 8SK, 8CO, 2AIM, 8CL, 8XO, 8WP, 8IG, 8ALY, 8JA, 8ZW, 9YO, 9CL, 9PC, 9IK, 9GY, 9DK, 9EO, 9DR, 9EG, 9NP, 9NN, 9HB, 9DA, 9RP, 9AAU, 9JS, 9UF, 9GJ, 9HQ, 9IQ, 9RM, 9XN, 3MJ, 3RS, 3DA, 3GM, 2AGJ, 2XA, 2IR, 2AG, 2LX, 2ZV, JMA WS, AR, GP, RDE, 5ZC, (all QSA)

Hope this list won't take up too much room but I give it all in hopes it will make some brother amateur glad to see that he has been heard in Battle Creek.

Also want to thank those sending me cards and letters as I surely appreciate them.

Yours truly,

H. E. HOUSE, 8NF.

*****

LONG DISTANT IN FACT

Here is some interesting news which the "QST" would like to read. I happened to stay up on the nights of October 24th and 27th (Tuesday and Friday) and "listened in" until about 3:30 the next morning, using a gelena detector. (This is a fact) During that time, I copied WST (Miami, Fla.) JJC (Japan, working KIE); NAR, NAY, KIE, WUJ, WNU, KHK, VAB, VAK, KPA, VAD, VAE, KPC, KSS, NPE, NPD, XNI (in Mexico), VAG and navy boats NMS, NQV, NWG and NOZ in the Gulf of Mexico.

In September and October, we worked with 6BJ, 6BY, 6AHN, and 6HO. Also have heard 6ZW, "JS" (Lodi, Cal.) 6AGW, 6SH and 6JZ. The past year we have worked with NRH, WIK, WQS and NSX.

Thanking you for putting same in "QST."

SEEFRED BROS.

H. C. S. 6EA

NAVY BOAT HEARS AMATEURS.

U.S. S. Tallapoosa,
Mobile, Ala.

Editor "QST"

Dear Sir:

Thinking perhaps some of the stations mentioned below would be interested to know that their signals are coming in strong in Mobile, I am writing so that they may be notified through you should you care to do so.

9BA, 9ME, 8LZ, 8LD, and 8JZ are the particular ones I heard last night between ten and eleven o'clock, 90th merid. time. I can compliment them all on their business-like way in which they carry on work. Very short and to the point and not a lot of useless calling. There are a lot of others that I hear but the signals are too faint to read and there seems to be a multitude of them.

I haven't much chance to listen for short wave stations as I have to keep on 600 and 900 meter waves for the naval stations, but what stations I have heard, and considering the distance, would not hesitate to say that a lot of them are more efficient than commercial stations of 2 to 5 K. W. I have a ½ KW 500 cycle set here that is very efficient.

Now that good radio weather is coming on we are picking up stations on both coasts and actually get QRM from WGO and WGB.

If there is anything I can do for you down this way let me know.

Truly yours,

H. L. BROWNLIE.

P. S. Eleven to two watch logged following stations; 8VY, 8NG, 9NN, 5BV, and 9GY, sigs strong.

*****

DUBUQUE COLLEGE WIRELESS STATION.

The erection of a station for the College was started in the fall of 1915, and has progressed until now it is considered one of the best in the west.

The apparatus is placed in a sound proof room of ample size situated in the

balcony of Clark library in Loras hall. The room is ideal for the purpose, as it retains all noise from the transmitter and is of great assistance in the reception of faint signals.

The receiving set is nicely arranged in a roll top desk. The system in use is the very latest and is called the "ultradion" circuit. Three pairs of head 'phones enable as many students to listen in at the same time. The radio room is equipped with a typewriter and desk.

The transmitting equipment finds a place on a capacious shelf away from the receiving set. An automatic change-over switch, operated by a push button on the desk, makes the change from sending to receiving. The power is obtained from the regular lighting circuit. The high tension wires are well insulated. The transmitting set should have a range of fifteen hundred miles.

Periodicals dealing with radio telegraphy are received regularly and placed on file in the radio room for handy reference. There is a library of books on this science, written by both American and foreign authorities. There are at present about forty volumes, and the number is rapidly growing.

Outside the room and at the other side of the balcony is the code practice table. This has a handsome oak finish and is equipped for ten students. Each student has a head 'phone and key. The instructor takes his place at a master table at one end.

At present there are but two licensed operators, however, as a result of this years radio course, it is expected that there will be more. The station is licensed and has the call 9AJT.

Taken as a whole, the station is to be compared with any in the west. That Dubuque college is ranked so high in the development of this art is mainly attributable to Father Clark, to whom the college is indebted for such splendid equipment, and the opportunity to give its students a thorough knowledge of this valuable science.

YOUR CALL HERE?

Cambridge, Ohio

Mr. C. D. Tuska,
Hartford, Conn.

Dear Editor:

I enjoy reading the letters from other amateur radio bugs in your valuable magazine "QST." I have copied on favorable nights within the last year amateurs from every district excepting six and seven.

No doubt many fellows will be surprised to see their calls in this list.

1ZL, 1LL, 1UF, 2XA, 2XZ, 2VN, 2LD, 2UF, 2LK, 2AGJ, 3TQ, 3RX, 3AG, 4DI, 4CL, 4CJ, 4AA, 5JO, 5BV, 8GL, 8EJ, 8IK, 8RM, 8GW, 8UE, 8NY, 8VJ, 8IF, 8YI, 8QE, 8NF, 8NH, 8IC, 8GN, 8JA, 8WP, 8AEZ, 8AEM, 8VX, 8CO, 8ZI, 8ZO, 8LJ, 8CS, 8OU, 8KF, 8RD, 8JY, 8XA, 8YA, 8YL, 8ZN, 8ZU, 8XP, 8XD, 8XO, 8XE, 8EE, 8AC, 8NJ, 8AA, 8AOR, 8ACM, 9YO, 9GJ, 9VY, 9AAB, 9XE, 9ZS, 9XV, 9YV, 9EM, 9PC, 9NN, 9IK, 9SP, 9AC, 9OY, 9JN, 9LO, 9WG, 9GY and WA (Barrackville, W. Va.)

Trusting the above list will be interesting to many and any one hearing my sigs will drop me a card;

I am, yours very truly,

J. HOMER McMUNN.

*****

FORT WAYNE, IND. AT IT TOO.

I just received a card from 4AA in Ga. saying he had received me on all good nights when I was working. I heard him one night and called him, he got me O. K. but could not work him on account of QRM. He was using 300 watts at the time. Isn't that some record from Ga. to Ind.? Have been heard in Hartford by 1VN. This makes my transmitting and receiving range about 1,000 miles.

G. D. BARNES, 9VY

*****

CALLS FROM CHICAGO, ILL.

Following Mr. Spencer's idea I am enclosing a long list of calls which I have heard at my station between Oct. 1st and

Nov. 7th. Nearly all of them were strong and easily readable.

1VN, 1DV, 2ZV, 2ZL, 2LK, 2AGJ, 2PM, 2MV, 4DG, 4CL, 4AA, 5ZC, 5BV, 5ED, 5DU, 8AEZ, 8NH, 8PA, 8OH, 8CL, 8CO, 8CX, 8CS, 8AAK, 8JX, 8JZ, 8XA, 8YL, 8YO, 8AOI, 8AOF, 8JA, 8AJA, 9GY, 9EG, 9AAB, 9ABD, 9GJ, 9EP, 9MQ, 9TA, 9DC, 9VY, 9HQ, 9RP, 9DV, 9IC, 9UT, 9DB, 9NU, 9ADL, 9JI, 9ACM, 9LR, 9VK, 9NN, 9YA, 9YI, 9XN, 9ACS, 9AGA, 9NE, 9VP and WS (Monticello, Iowa.)

On one of the nights I plainly heard and copied 8JA talking to 9XN for nearly an hour. I have heard 2AGJ as loud as 9AAB who is only thirty miles away. I hear 5BV, 5ED, and 5DU nearly every night.

Wishing that the "QST" magazine will continue to be an interesting magazine, I am,

Yours truly,

L. E. DUTTON, 9ALM

*****

GOOD WORK.

Indianapolis, Ind.

American Radio Relay League, Inc.
Hartford, Conn.

Dear Sirs:

Enclosed please find application blank to the American Radio Relay League. Have been thinking of joining for a long time and think my station is now eligible. I attribute a good portion of the efficiency of my station to "QST" which is always very welcome and interesting. The most inefficient part of the station is the aerial which is only 43 feet high, but this will be raised to about 60 feet soon, thereby increasing the efficiency.

Following are some of the stations that are often copied here; 1ON, 1MD, 1OD, 1OZ, 2AGJ, 2JU, 2LK, 2LI, 2LD, 3ZS, 4AA, 4CL, 4DG, 4DI, 5ZC, 5DU, 5AM, 5BJ, 5BV, 8NH, 8ACK, 8AOF, 8YO, 8AEZ, 8NF, 8NG, 8YL, 8OH, 8CO, 8CS, 8UE, 8CN, 8AGF, 8AAK, 9GJ, 9BD, 8AMG, 8NAA, 9HG, 9DC, 9MG, 9IK, 9PC, 9WF, 9GL, 9GY, 9AIK, 9EM, 9VY, 9LR, 9LT, 9WG, 9AAB, 9XR, 9AFO, WS. Can hear 2AGJ, 8NK, 5ZC, 5DU, 8CO and 4DG two feet from the 'phones at times.

Wishing "QST" and the American Radio Relay League all success, I remain,

Very truly yours,

FRED FINEHOUT

*****

SPARK COILS

There are of course scores of amateurs who think a spark coil capable of nothing but shrieks and groans, etc. Possibly you get this idea from the "Kid next door" or it may be that you have formed an opinion that a spark coil is of no account because it doesn't make enough racket.

I know of some amateurs who possess transformers that kick up such a rumpus while sending that they have to stuff cotton in their ears; but most all of their noise stays to home however.

Being located in the country, I haven't quite so many advantages perhaps as some of you city fellows because I have to resort to the old spark coil to make myself heard. I have, however, done what I consider pretty good work with my two inch coil which consumes about 12 watts.

I have worked 9IK repeatedly in the daytime; a distance of about seventy miles.

M. B. West writes as follows: "Have often heard your station and signals. Easily readable."

I can work twenty-five to thirty miles any time. I use an oscillation transformer oil immersed condenser, and series condenser to reduce my wave to 200 meters.

L. M. SMITH,
Salem, Wis.

*****

RADIO LESSONS BY WIRELESS

The Radio Station at the State University of Iowa, Iowa City, Ia., has arranged to send QST on Tuesday, Thursday and Saturday nights at 8:10 Central Time. On Tuesdays and Thursdays, the message will consist of a short radio lesson, while on Saturdays, it will be composed of University news. At present, the wave length is 500 meters, but this will be changed to 1600 within a few weeks. The call letters are 9YA.

Among the Radio Clubs

GALLOTIN RADIO CLUB.

Bozeman, Mont.

On Oct. 25, the amateur wireless bugs of this town got together and formed the "Gallotin Radio Club." Two meetings have been held and the following officers elected: Pres. Everett Cutting; Vice Pres., Earl Daws; Sec'y and Treas. Harold Sheard; Librarian, Lewis McRoberts. The club has a regular meeting every Tuesday evening in the Y. M. C. A. building.

The object of the club is to get together all the amateurs that are interested in radio work, to regulate radio communication and promote co-operation among the members. A library of books pertaining to electricity and wireless will be established and put in the hands of the librarian. Talks will be given at the club by college professors of this state.

It was unanimously voted by the club that all members join the American Radio Relay League. Communications from other clubs is invited and should be directed to the secretary in care of the Y. M. C. A. of this city.

H. P. SHEARD, Sec'y.

*****

PORT MORRIS RADIO CLUB.

The Port Morris Radio Club was organized by the amateurs in and about The Bronx, New York City. It has been in existence for six months and the membership is steadily increasing. The meetings are held every other Saturday evening. All applicants for membership must pass a code test at a speed of fifteen words per minute and possess a Government License in order to become a First-class member and less than fifteen words to become a Second-class member. The officers of the Club are:

G. F. Tompkins, President, William K. Storrs, Secretary-Treasurer, Joseph Skliar, Chief Operator. A Library Committee has been formed and the members are now adequately equipped with reading matter on radio subjects. All amateurs interested may communicate with Secretary William K. Storrs, 513 East 144th Street, New York City.

*****

HAWKEYE RADIO ASSOCIATION.

The Hawkeye Radio Association, of Iowa, has inaugurated a new plan of working "Relay" messages. On every Friday night at 9:30 p. m., the Iowa State College Station, 9YI will start a message. Every station hearing this is requested to send the same message to the next station farther distant from the starting point. The route the message has taken should follow the message itself. The instructions are "Send this message as FAR as possible, as FAST as possible, and in every direction possible across the United States." When it has reached the boundaries in any direction, or for any reason it is impractical to send it farther without a loss of time, the last man is to notify the Relay Manager, 131 Hyland Ave., Ames, Iowa. The following information is wanted: The route the message has followed; The time it has taken in going over this route; a copy of the msg. itself, to check up on accuracy. Stamped cards will be sent anyone who is willing to take a hand in this work of reporting results. A Bulletin will be printed on the results of the work from time to time, and sent to those expressing an interest. This work is not undertaken for any personal advertisement, or to sell any certain line

of apparatus. The message will be from some authority and will be about matters of general interest. No routes will be planned out beforehand, no advance notices sent out, and in this way it is thought that the same conditions will be met that an ordinary message will meet. It is hardly a fair test of a relay msg to have notices sent to everyone concerned by MAIL in order that it will be more liable to go through.

*****

WIRELESS ASSOCIATION OF PENNSYLVANIA.

At the regular meeting of The Wireless Association of Pennsylvania, held in Philadelphia, Nov. 10th, considerable discussion was entered into regarding "QRM" on the part of certain amateurs, and the failure by most experimenters to give their call numbers slowly and to sign off slowly and distinctly. The wisdom of a deliberate method of writing was also discussed.

Some of the interference bothering amateurs is at times malicious, jamming the key being one of the favorite pastimes, fortunately by a few only. Certain amateurs are marked for distinction in this respect, and if sometime they are brought up with a sharp turn the fault will be theirs. Already efforts are being put forth to apprehend the offenders. The law governing this matter is fully applicable to the needs of the hour, and if it is invoked amateurs who regard the law and work with common sense will appreciate it. So far as Philadelphia is concerned this warning will doubtless call a halt on this kind of "QRM."

Amateurs are in the field for study, or should be. It is fair to say that when messages are sent into the air by an amateur it should be not only for his good but also for that of the person to whom it is sent; likewise for that of all other amateurs who are listening-in. Otherwise, it were better for the sender to use the mails or the telephone. The law respecting secrecy is of course not to be violated here any more than if the msg. is commercial or governmental, but the idea is that we are amateurs engaged in a common study to advance the science of radiotelegraphy; and if the novice or other amateur engages in a pre-emption of the air for his or some other single person's advantage, real or seeming, he should move to some such place as will accomodate him and his friend in their selfish purposes.

However, amateurs are fortunately in the main a good set of fellows, and when this matter was presented seriously to the meeting of the association, the members fell into the spirit of the criticism, and we hope to see good results.

"QST's" are to be sent broadcast suggesting that each amateur regard other amateurs as being in sympathy with his desire to reach the person to whom he is sending his msg., but at the same time thousands of fellows are listening in for the experience it gives them, and they are also entitled to consideration.

The advice is therefore given that if we wish to transmit, let us first listen-in for a space of time sufficient for us to determine that our turn has come. Then we can go ahead, first by three slow calls, which all can understand; then by a carefully sent out msg. with its dots and dashes, well placed words, well spaced, and the whole msg. well condensed, and finally with the sig. repeated three times slowly and distinctly. Let this work be done with the end in view to mortgage the air for as short a time as possible and not to interfere with the rights and privileges of other fellows waiting for their turn. What sense is there for five or six fellows to send out msgs. at the same time, at the same wave length, with the same power, each sender being within a radius of four or five miles! This happens frequently, but what does it subserve to any one? Every one will regard it as a nuisance.

Another matter discussed was the advisability of avoiding as much as possible all local sending after eleven o'clock at night to midnight at least. After eleven p. m. let us avoid doing local work and devote our energies to receiving messages from a distance or sending at a distance when required. In this manner amateur work will become a pleasing study and not a selfish one, as some practice it.

In this neighborhood some fellow delights early and late in the evenings to

send with all the power of his station long dissertations in a foreign language to a station not far away. This may be delightful to one or both of them, but it is of no practical use to the hundreds of others who want their chance to do experimenting with their sets.

Let us, as a family of good fellows, consider the wisdom of a generally adopted plan of following as near as possible the suggestions above given, and especially the one referring to the use of the air for long distance work only after eleven p. m.

GORDON M. CHRISTINE, M. D.

Mexican Girl Gets First Grade Commercial License

Maria Dolores Estrada has passed the examination for First Grade Commericial Operator. When in Mexico, she was employed by Carranza as his private telegrapher on his Official staff. Last January, she came to the United States to learn English. She was entered in the Fairmount Seminary as an Official ward of the Mexican Government. After Miss Estrada had learned some English, she took a course with the National Radio School, Washington, D. C., and in a few weeks succeeded in adding to her knowledge of telegraphy, sufficient to pass the rigorous examination. During the Mexican troubles, Miss Estrada has passed through many nerve-racking experiences. She expects to return to Mexico.

THE OLD MAN

(Continued from page 27)

alone and unattended. The only thing we know is the post mark, and this we absolutely decline to divulge. It might "kill the goose which has laid our golden eggs." This dear old friend of ours who, the madder he gets, the more he makes us laugh, sprang into prominence when QST published his "ROTTEN SENDING" in May 1916. Since that time, QST's O. M. has become really famous. His articles get rottener and rottener as he goes on. In this issue he reaches his climax and we have the "ROTTENEST" article on the "ROTTENEST" subject of all.

The Old Man is QSA the strongest of any of us, and his long distance work cannot be approached. He is read in nearly every amateur station in the United States, a large number of the Commercial stations in Sweden, England, France, Australia, Cuba, Chile, Mexico, Canada and even China. He certainly knows what he is talking about, and the Editors of QST know the whole radio world joins them in hoping that he will live long and prosperously, and continue to have his troubles, and tell us about them.

This new department has been opened up for the benefit of the readers of "QST". Letters should be addressed, "QST", care of The American Radio Relay League. The Queries Department, Hartford, Conn. The questions will be answered free of charge and as promptly as possible. The answers will in each case, appear in "QST", provided however, they are of interest to the average reader. We are not in a position to answer questions requiring a long, mathematical solution.

The Editor hopes to receive a large number of interesting questions for the next issue. He trusts that you will make your questions of general interest and will refrain from asking questions which you can answer by consulting the Radio Laws and the Call Letter Books. "QST" does not wish to pad this department out with a series of uninteresting, foolish, questions.

Geo. Van Kirk, Pa.

What is the fundamental wave length of a 1 wire antenna 400 feet long, 70 feet high at one end, and 60 feet high at the other with a lead-in of 45 feet.

We again wish to refer to answers to this question which have appeared in October, November and December issues.

To determine the fundamental of any antenna approximately, multiply the total length of the antenna from the apparatus to the end of the wire in meters, by 4.7. In your case the result is approximately 635 meters.

*****

S. Arthur Touroff

1—Furnish full directions and data for constructing a 1 Kw. 2,500 volt transformer for use with a rotary quenched gap.

We presume this transformer is desired for use on 110 volts, 60 cycle A. C. While we have not the space to devote to the minute constructional details of such a transformer, if you will use your own ingenuity on the following information, you should be able to secure the desired results: Materials: 35 pounds of high grade, soft, black iron; 5lbs. No. 10 D. C. C. magnet wire; 8 lbs. No. 30 enamelled magnet wire; a quantity of paraffine paper cut 4 inches wide; tape; shellac. The iron should be secured in strips 1 7-8 inches in width and .015 inches in thickness approximately and can be supplied by the Adams-Morgan Company in this form. Cut a number of strips 10 inches long, and a number 7 inches long. Form them into groups of 4 or 5 strips each, and with these groups build a frame 9 inches by 12 inches outside measurement, the legs of the frame being 2 inches square approximately. This is accomplished by lapping the groups alternately. This gives a dovetail at the corners as per Fig. 1. Now bind the

Fig. 1

iron of each leg with tape, and take the frame apart. On one of the shorter legs, and using a winding space of 4

inches, wind 250 turns No. 10 D. C. C. magnet wire. Secure the ends well and shellac. Next secure a round core 2⅝ in diameter. Wind on this a layer of light cotton wrapping with shellac, and you are ready for the winding of the secondary. A layer of paraffine paper should be put on between each layer of wire, and this continued until 5,800 turns have been put in place. Secure the end of the wire, pull out the string from next the core, remove core, bind the secondary winding well with a thin cotton tape, (pass tape thru center, over the coil, thru center again, etc.) shellac the tape covered coil, slide it onto remaining short leg, assemble frame, tightly in place by wooden frames or clamp frame tightly in place by wooden frames or clamps, and the machine will be ready for connection. Do not impregnate the secondary with paraffine. If you desire to do this, use No. 30 S. S. C. C. magnet wire for secondary, inasmuch as paraffine seems to effect a disintigration of the enamel coating.

2—The Clapp-Eastham ½ Kw. Rotary Quenched gap would probably give service some time on the above transformer. You could not however expect it to do so indefinitely.

3—I have three Telefunken Jars. How many will be necessary for use in conjunction with this set.

If you desire to operate on 200 meters, two will be sufficient.

*****

Lloyd C. Green, Mass.

1—Please be more specific as to data and dimensions when requesting information. Without dimensions, or knowledge as to type of your commercial receiving transformer we cannot give information as to its range, or as to the circuit to which it is best adapted for long, undamped wave reception. No doubt you will be able to gather the information you desire from Mr. Godley's articles in the August and September numbers, 1916.

2—If you wish to wind your tubes (6¾ inches by 24 inches and 7¾ inches by 24 inches) full length for long wave reception, use No. 22 D. C .C. on the smaller and take taps off every inch; use No. 28 S. S. C. on the larger, and take off taps every 1½ inches. The natural wave length of the larger coil will be in the neighborhood of 2,100 meters, and cannot therefore be used with any degree of success below about 3,000 meters.

*****

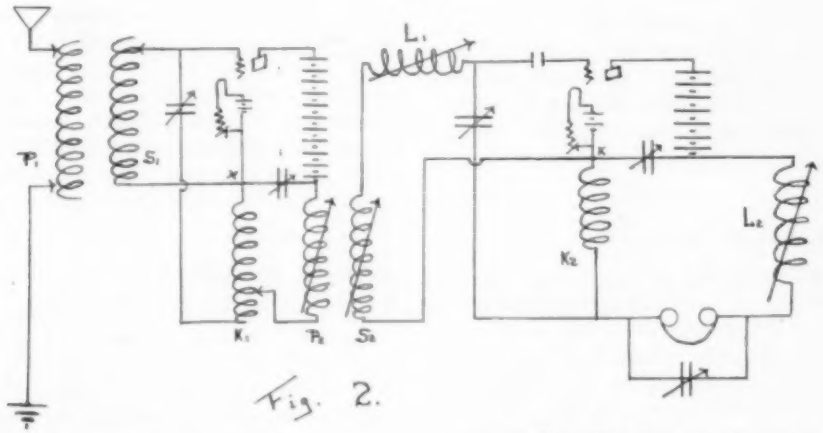


Fig. 2.

R. J. Nichols, Mich.

1—With reference to above diagram what are the relative values of the inductances employed? Correct size wire to use in winding?

We presume you wish the dimensions of the coils. S-1, P-2, L-2,

and, —providing L-1 is omitted (it may be omitted) — S-2, may be the same, —ie; 6 inch dia., 14 inch long wound with No. 30 S. S. C. magnet wire, taps taken off every inch. K-1 and K-2 the same, —ie; 5 inch dia., 8 inches in length wound No. 28 S. S. C. The size of P-1 depends entirely upon the fundamental of the antenna employed. If it is desired to —L-1, substitute S-2 for L-1, using in place of S-2 a coil 5 inch dia. by 5 inch long wound No. 28 S. S. C. No. 26 D. C. C. may be used on P-1.

2—Correct maximum capacities of condensers respectively? Telephone condenser .003 (Fill case of air condenser with oil) Grid condenser for second audion .0001; all other condensers .001.

3—Is not single turn variation by means of multipoint switches advisable in each inductance S-1 and S-2 not included?

No. Single turn adjustment is only necessary in the antenna circuit. Finer adjustment of wing circuit, and wing-grid circuit coupling values are provided by the variable condensers.

4—Should connection be made at point X in the diagram, or is it an error?

The diagram is correct Connection should be made.

*****

L. Brainerd Stratton, N. Y.

1—With the apparatus which you have you should be able to get the German high-power stations on any antenna over 75 feet in length and 50 feet in height, providing your apparatus is carefully made and the proper circuits employed.

*****

Geo. W. Knight, Mass.

1—Your failure to get a greater distance than 2 miles with the transmitter which you describe, is most likely due to the fact that your closed oscillatory and open circuits are not in resonance. You should provide yourself with a hot wire meter for use in the open circuit. We might suggest that the short antenna only should be used for transmitting. You should be able to do better work than you have been doing.

2—We fail to find hook-up which you say you enclosed. Without this and detailed information as to the receiving apparatus which you employ we cannot state why you do not hear more amateurs. We might suggest that the antenna condenser would serve its purpose better if the castor oil was taken out.

3—Galena is generally considered the best crystal detector. It may be secured from any wireless supply house.

*****

Carroll St. John, Ohio.

1—We cannot devote space to giving you full dimensions and details covering a 2,000 miles receiver and a 550 mile transmitter. We suggest you purchase a copy of "Wireless Telegraph Construction for Amateurs" by Alfred P. Morgan (Adams-Morgan Company—$1.50 net).

*****

Henry Klaus, Ills.

1—If the entire ignition system on your gas engine is enclosed in a metal housing and the housing grounded it will aid in eliminating the interference from this source We can suggest no remedy for the interference occasioned by the telephone ringer across the street.

*****

C. R. Pardridge, Mich.

1—In-as-much as all so-called "synchronous" motors are not really synchronous, but lag slightly, you will find it impossible to provide a synchronous rotary gap by using the induction motor you have.

*****

Alfred E. Runk, N. Y.

1—We have re-drawn the "Chambers" circuit which you enclosed. It will now be seen that the only difference between this circuit and the conventional audion circuits is the connection between the wing of the audion and the antenna. The purpose of this connection is to allow a transfer of energy from the wing circuit, to the secondary or grid cir-

cuits via the antenna circuit. With sufficient such coupling between the two circuits (G and W) the audion becomes

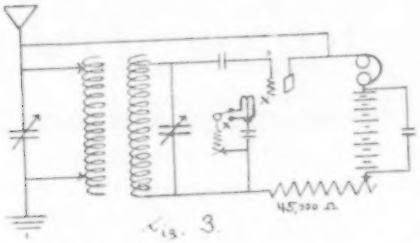


Fig. 3.

a generator of continuous waves, and may be used as a hetorodyne receiver. Inasmuch as coupling is provided as above, it is an Armstrong circuit, though not well adapted to the best reception, due to the fact that, in order to provide sufficient coupling between the Wing and Grid circuits for the production of oscillations, it is necessary to use a very close coupling between the antenna and secondary circuits. A high percentage of coupling between any two oscillatory circuits, materially raises the resistance of both circuits, and is therefore obviously undersirable. The points marked X in the diagram are, respectively, the switch giving access to either filament of the audion, the filament, and the grid. The condenser shunted around the high tension battery is presumably provided to pass the high frequency currents around the resistance (?) offered by the battery. It may better be employed in shunt to the 45,000 Ohm rheostat. The double pole double throw switch and connections for change-over which you have used are OK.

2—What capacity is the condenser in series with the grid?

The capacity may be .0001 or thereabouts.

3—What ohmage is the rheostat in series with high voltage battery and where may these be obtained?

45,000 Ohms. Write the Joseph Dixon Crucible Co., New York

4—Is this circuit as good as the Armstrong circuit, or do you think that with a 150 aerial and 2,000 ohm phones I can receive Germany?

We have explained above that this is an Armstrong circuit. More satisfactory results may be obtained with the circuits shown in Figs. 13 and 16 on pages 198 and 199 respectively of the August issue. The same coupler may be employed for the three circuits, and you should be able to hear Germany.

5—What kind of bulb do you consider best for this hook-up?

You will have better luck with a tubular bulb in conjunction with this circuit. Any type bulb should give results with the circuits to which we referred you.

6—Give weight of wire used in construction of coupler described on page 211 August "QST."

Primary 1½ lbs. No. 24 approximately. Secondary 9 Oz No. 30 App.

*****

Harry Isaacson, N. Y.

1—Can a loose coupler of the following dimensions be used with an antenna 60 feet in length; primary 15 inches long, 6 inches dia., No. 20 enamelled; secondary—15 inches long, 5 inches dia., No. 24 cotton covered wire?

We presume you wish to use these combinations for long, undamped wave reception. If so, yes. Better use No. 28 wire on your secondary, and lengthen your antenna 40 to 50 feet.

*****

Raymond Worth, Ills.

1—Will the use of a series antenna condenser eliminate the noise which sounds like a telephone ringing?

No. See answer to Henry Klaus above.

*****

N. B. Stackpole, R. I.

1—See answer to Francis Blewer October issue. You should have no difficulty what-so-ever in getting action from this circuit. You may also be able to gather some information from the December issue, page 3.

*****

Harvey H. Mitchell, D. C.

Your questions are rather vague. The same apparatus may be employed for the

reception of both damped and undamped waves. The only change necessary is in the method of detection. Read "Applications of the Audion" in August and September issues of this magazine, also see answer to R. C. Bender below.

*****

Thos. Pilling, N. Y.

Your questions also lack clarity and we do not follow you in your reference to "coils 1 and 2" and "dimensions of the tubes." See answer to H. R. Butt, Va., December issue.

*****

R. C. Bender, Pa.

1—Please give diagram for combination audion and 2-step amplifier for reception of both damped and undamped waves.

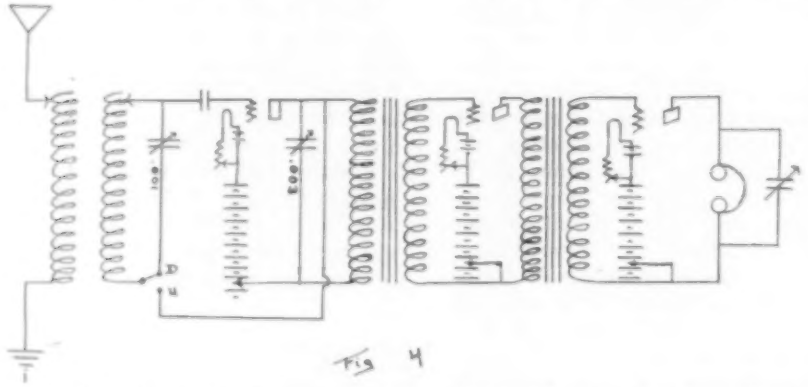


Fig 4

2—Which is the most efficient, the spiral or pancake type of oscillation transformer?

Either may be used with equal efficiency The tendency as a rule with the pancake type however, is to get too close a coupling between closed and open circuits.

*****

K. R. Lynde, Mass.

1—How can I arrange a switch to change immediately from one wave length to another, for example from 200 to 400 or to 600?

This is a rather difficult question to answer in breif. You should first carefully tune your transmitter to each of the wave lengths in order, noting the amount of closed circuit inductance, open circuit capacity if any, and open circuit inductance for each wave length. The mechanical design of a switch to give access to the inductance and capacity required for each wave length is something which you should be able to work out for yourself by the application of a little study and ingenuity. A switch of this sort should be of interest to readers of "QST," and we should be glad if your efforts resulted in a description of a well designed device.

2—What is the most efficient way of employing a common helix for sending with a transformer of ¾ Kw. rating?

Such a helix may be used efficiently providing pains are taken to employ loose enough coupling. This may be accomplished as shown in the diagram. Fig. 5.

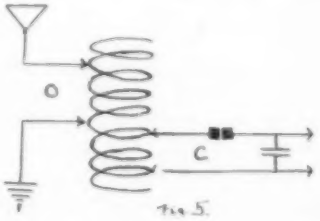


Fig 5

Here we have conductive coupling in contradistinction to direct coupling,—ie; there are no turns in common.

FOR SALE & EXCHANGE

FOR SALE OR EXCHANGE—Four-bar telephone magneto and case, $3.50; type "O" Crystaloi, perfect condition, $2.98; pair Brandes Superior Phones, postively perfect condition and but one month old, $4.95; SPST slatebase 6OA25OV switch, $.85; Tillotson sounder, $1.35; Mignon RBD8 receiver, positively perfect condition, brand new bulb, only $27.75. Everyone answered. Everything prepaid. L Brainerd Stratton, Oneida, N. Y.

WANTED—One-half Kw. transformer; state age, range and price. Other ½ Kw. apparatus also wanted. State lowest cash price. City offers preferred but all will be considered. J. H. Hilf, 306 N. Graham St., Pittsburgh, Pa.

FOR SALE—One-quarter Kw. Blitzen transformer, new, $10.00. Walter Koyen, Barron Ave, Woodbridge, N. J.

FOR SALE—Type A crystaloi detector with resonance coil. First offer of $2 takes it. William K. Storrs, 513 East 144th St., New York City.

FOR SALE OR EXCHANGE—Brand new $10. Premo filmpack camera. Want Brandes Transatlantic phones, Ideal Blitzen tuner or $7.00. Might use other good phones, variables or M. A. F. Have a few new Electron relay bulbs. F. R. Pray, 102 Heath St., Winter Hill, Somerville, Mass.

WANTED—One spark coil, eight to twelve inches, with vibrator suitable for use with storage battery of sixteen volts. Give price and full details to Dr. Louis Leroy, Memphis, Tenn.

FOR SALE OR EXCHANGE—Complete wireless set. Best offer takes it. Henry Weaver, 1002 Bellaire Ave., Pittsburgh, Pa.

FOR SALE OR EXCHANGE—Have a set of electric trains and tracks, N. Y., N. H. & H. type, will sell for $4.00 or trade for a good variable condenser. Lester Reiss, 580 West 161st St., New York City.

WILL EXCHANGE— My Milli-ampere meter for variable condenser in good shape, or what have you? All letters answered. Howard C. Gates, Ponomo, Cal.

FOR SALE—One-half Kw. rotary gap complete with ⅛ H. P. induction motor, operates on 110—125 volts. Will sell for $7.50, worth much more. Write Sunrise Signalling Station, Ponomo, Cal.

FOR EXCHANGE—One 1913 Indian motorcycle in good condition. Will take good wireless outfit, sending and receiving. I also want three inch coil and 4,000 meter coupler for cash. F. F. Gray, Wickes, Mont.

WANTED—$4.00 for a two inch spark coil; first postal order takes it. R. M. Roberts, 109 Simonean St., Saginaw, Mich.

FOR SALE—Clearing out unnecessary equipment—unusual bargains. 1 Radio Apparatus Co. loose coupler with dead end switch, exactly as good as new, cost $25. will sell for $12. 4 DeForest audion bulbs, both tubular and round;

been used less than two hours, exactly good as new, $2.00 each. 1 home made ¾ Kw. transformer, very efficient, high voltage, well insulated, has worked 1,000 miles, has $15. worth wire on it, will sell for $15.00. 1 pair Brandes 3200 ohm $13. phones, especially small and light, good as new, will sell for $6.00. 1 pair Brandes 2,000 ohm $5. phones, good as new, will sell for $2.50 1 pair Manhattan phones, good working order, $1.50. 1 doz. pint Leyden jars, cost $1.10 each, have transmitted 1,000 miles, best quality glass, all in fair condition, will sell for $.50 each. 1 Murdock wave meter with detector, variable and inductance, first-class condition, $5. 1 latest type Arnold loose coupler in perfect condition except small corner rubber back broken off, $10.00. First come; first served. C. Powell, Drawer 4, Hartford, Conn.

FOR SALE—New round two filament DeForest audion and amplifier bulbs. Cahn, 746 Greene Ave., Brooklyn, N. Y.

WANTED—Variables mounted or unmounted; state price and condition. Will sell large helix which cost $10. for $2.50. L. Spaulding, 172 32nd Ave., San Francisco, Cal.

FOR SALE OR EXCHANGE—A pair of E. I. phones (2000) ohms leather headband in good condition. Would like a crystaloi detector or spark coil in exchange or what have you? Henry Simonson, Box 355, Alden, Minn.

FOR SALE OR EXCHANGE—The following ignition outfits: Splitdorf (without condenser), Dole, Atwater, Kent, Splitdorf (with auxiliary condenser) and Pittsfield.—2 spark coils; 4 pony relays, type S. S. motor; 10 carbon wetcells—all in A1 condition.

WANT—Variables, audion bulb, phones, watermotor, step-down transformer, and a rifle. Send for complete list. (please enclose stamp). R. Grimshaw, 6 Port St., Pulaski, N. Y.

FOR SALE—Complete transmitting outfit, ½ Kw. Blitzen transformer, with three varations of power; Murdock oscillation transformer; Murdock condensers; Radio Apparatus Co.'s high speed rotary gap with Universal motor and rheostat; Marconi key; aerial switch; lightning switch. Also have ¼ Kw., 72 volts, A. C. Eck rotary converter with starting rheostat. Paul C. Elliott, 162 East 66th St., New York, N. Y.

WILL EXCHANGE—My complete sending and receiving set for small screw cutting metal lathe. Sending set comprises 1 Kw. Thordarson, edgewise wound O transformer, hot-wire ammeter, (5 amp.) oil immersed glass plate condenser, large high speed rotary run by 1-15 H. P. G. E. motor, radiation, 5 amps. Receiving set comprises, double audion and Audiotron panel, Brandes 3200 phones, 15,000 M. Cambridge tuner, small 2500 M Murdock tuner, variometer, two 43 plate Murdock V. condensers, 6V-30A storage battery, Perikon detector, 2,000 ohm mica diaphragm amplifying phones and change-over switch. Instruments are all in excellent condition and will be guaranteed in every respect. S. H. Besley, 171 East 7th St., Salt Lake City Utah.

FOR SALE OR EXCHANGE—One radio receiving transformer, $5.00; Universal detector stand, $1.00, 150 watt step-down transformer, $3.75, ¼ Kw. condenser, $2.50. All in excellent condition. Cecil Bridges, Louisville, Ill.

FOR SALE—Large panel type audion receiving set. Audion circuits for both arc and spark. Tunes to 5,000 meters. Has dead-end switches. Reason for selling: going to college. Price, $75.00. complete with three Blitzen variables and Murdock phones. Write J. Wallace Peckham, Aquiduck, R. I.

FOR SALE—¼ Kw. Pittsburgh Wireless Equipment Co. transformer and condenser in fine condition. Will answer all letters. Robert Wolf, 104 W. Main St., Plymouth, Wis.

THE WAVE METER CONTEST

Dec. 10th, 1916

The clubs have not yet had time to get their work very well started in this contest as this issue goes to press. We will therefore not attempt to make any report on their activities.

To make things more interesting for the individual, we have arranged a sort of sub-contest. The conditions are as follows:

> For the best article describing how you secured ten subscriptions for your club's credit in this contest, we will give five dollars. For the second best article, three dollars. Third prize, two dollars. Fourth and fifth prizes are subscriptions to QST.
>
> The article may be humorous or serious, actual or imaginary, but ones that help others to get subscriptions will be given preference.
>
> To be eligible for this part of the Contest, you must have actually secured ten yearly subscriptions for your club.
>
> Hand the article in to your secretary with the ten subscriptions. He will forward them to us.
>
> This Contest closes the 15th of February and all manuscript must be in this office before midnight of that date.

See what you can do about this. Get ten subscriptions and YOU are eligible. "PEP" is the watchword.

PREPAREDNESS
OR QRXING FOR THAT 2AM. 600 MILE TEST

A Wave Meter Contest

MORE than one promising Radio Club wants a wave meter, but due to lack of money, it has never been bought. QST comes forward to create an opportunity for these Clubs. We will furnish the wave meter, if you will return a little vigorous work. The scheme is this:—We will give the wave meter shown in the illustration to the first Club which comes forward with one hundred paid yearly subscriptions to QST. As an extra reward, we will give a pair of first class head phones to the member of the Club who gets the greatest number of subscriptions for his Club.

This gives everyone a chance. Start in right now. The first Club which gets one hundred subscriptions gets the wave meter. Every other Club which also gets one hundred subscriptions during the two weeks following the first award, also gets a similar wave meter. Everyone has an equal chance, not only to earn for their Club a wave meter, but also to get for himself a pair of good phones.

There are no complicated conditions. Nothing but a little "Pep" is necessary. Get in the game today. Your Club wants one. It's the best wave meter we can find.

THE GREBE WAVE METER AWARDED TO THE FIRST CLUB SECURING 100 YEARLY QST SUBSCRIPTIONS

This instrument sells at $70.00. It is designed to work accurately on both long and short waves. It will measure up to 5,000 meters, and contains a high note, high resistance buzzer, in a sound proof rubber case, mounted in a rubber panel. All the printing on this instrument is engraved in the rubber and filled in with white composition. The coils are made of 100 strand Litzendraht wire which gives it an exceptionally low decrement.

MURDOCK "FIFTY-FIVE" PHONES GIVEN TO THE LEADER IN THE CLUB EFFORT

These 'phones have a resistance of 3,000 ohms and are leaders on the market. They are so well known that little need be said about them. A pair of 'phones anyone will be glad to own. Become the leader in your club so you can get them.

Write for subscription blanks.

WAVE METER CONTEST,
The QST Publishing Co.,
Hartford, Conn.

IT TELLS YOU HOW TO BUILD YOUR OWN APPARATUS

Everyday Mechanics

is the first and only magazine in the world devoted exclusively to constructional "how-to-make and how-to-do" material. It is edited by Thomas Stanley Curtis, whose articles and work you have known since the old days of ELECTRICIAN AND MECHANIC. It contains no war pictures, free write-ups of new devices, general news features. It is solidly and consistently filled, to the last of its ninety-six pages, with practical how-to-make and how-to-do articles.

EVERY FEATURE article that appears in the magazine is prepared from the data obtained in the actual construction and operation of the apparatus described. For every article, a model is constructed in the EVERYDAY MECHANICS EXPERIMENT STATION, Van Nest, N. Y., where it is given a practical working test. This means reliabilty and satisfaction.

EVERY NEW SCIENTIFIC discovery and achievement will be worked out in amateur form in the Experiment Station for the benefit of the readers of EVERYDAY MECHANCS in the future. A model showing the working principles will be described in detail in the magazine so that the serious experimenters of the country may strive to emulate the work done in the experiment station.

THIS MODEL SUBMARINE, CONTROLLED BY WIRELESS; has been described in past issues. The model is 5 ft. long; it is propelled by electric motor; it turns, dives, rises and fires a torpedo which explodes after leaving the boat, all at the will of the wireless operator on shore. Other models, just as ambitious, are in process of design. OTHER FEATURES have been the construction of high frequency apparatus to give gigantic sparks, trans-atlantic radio receiving apparatus, kicking coil apparatus, plant culture paraphernalia, and countless other articles that have delighted the hearts of the serious-minded experimenters of the country and have caused nearly 4000 of them to voluntarily write that EVERYDAY MECHANICS is the best practical magazine bar none, that has ever been published.

We want you to see and read EVERYDAY MECHANICS because we know you will need it and enjoy it. The subscription price is now 50 cents a year, but this is going to increase with the October issue to $1.00. The news-stand price will then be 10 cents. A dollar bill pinned to the coupon brings you EVERYDAY for two years if sent NOW.

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FINISH—Nickel front, with black insulated base
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DIMENSIONS—Diameter of base, 3 inches
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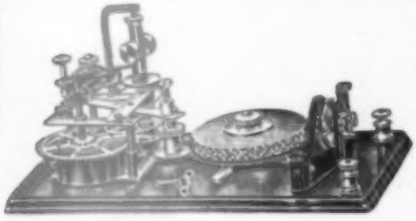

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Recognized by leading authorities as the most sensitive and most effective Detector existing. If not satisfied, return same and your money will be refunded.

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To this, Mr. Tuska adds this personal remark:

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Signed: C. D. TUSKA, Editor QST

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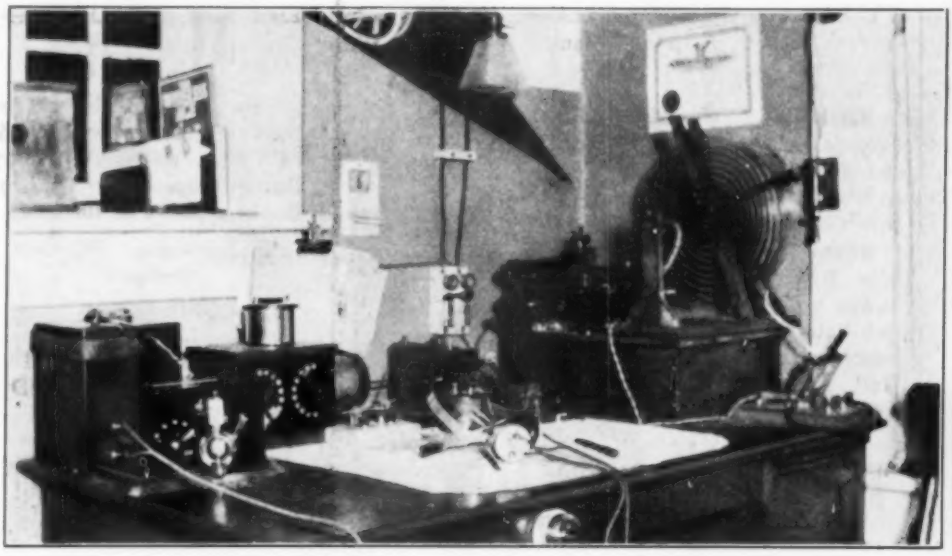

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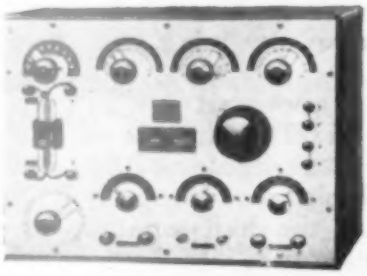

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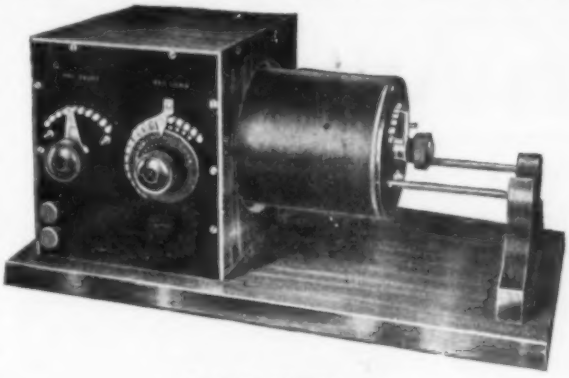

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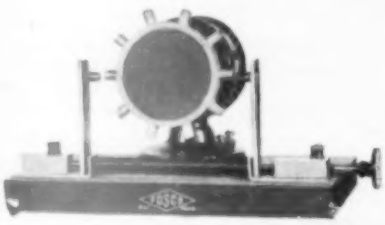

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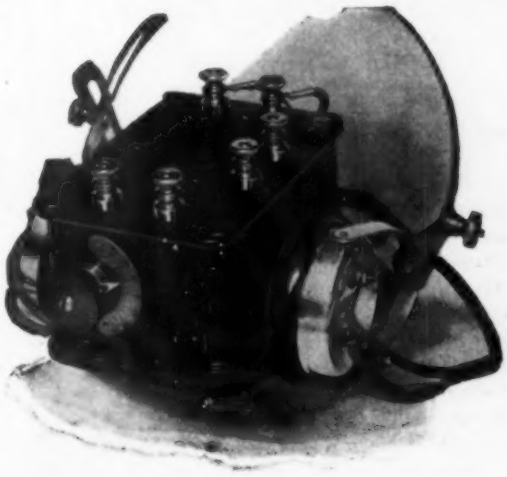

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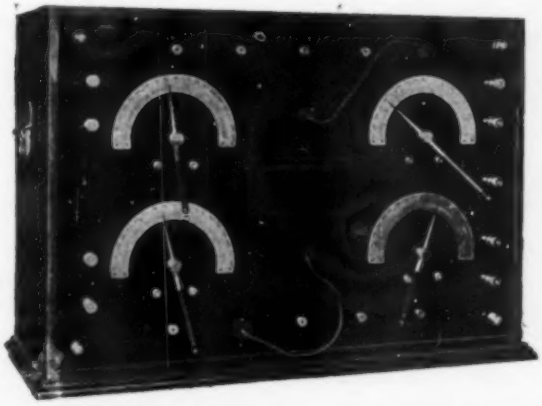

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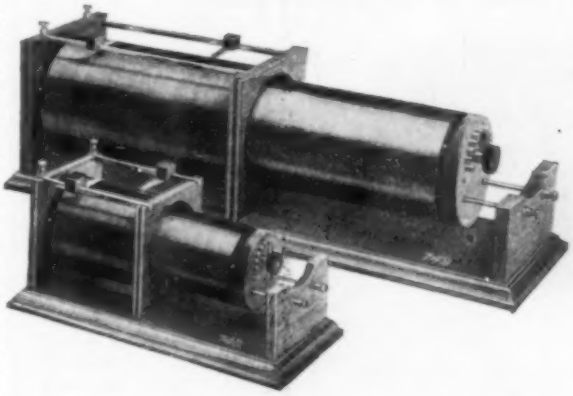

Our new Coupler No. 749 is 32 in. long, 9 in. wide and 10 in. high over all, and on the average sized antenna tunes up to 15,000 meters. This Coupler, used with the new CHAMBERS' SYSTEM OR CIRCUIT will bring in signals from domestic and foreign Arc Stations surprisingly loud and clear. Note the difference in size of our No. 748 and the new No. 749.

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Announcing the DeForest Tubular Audion Bulb

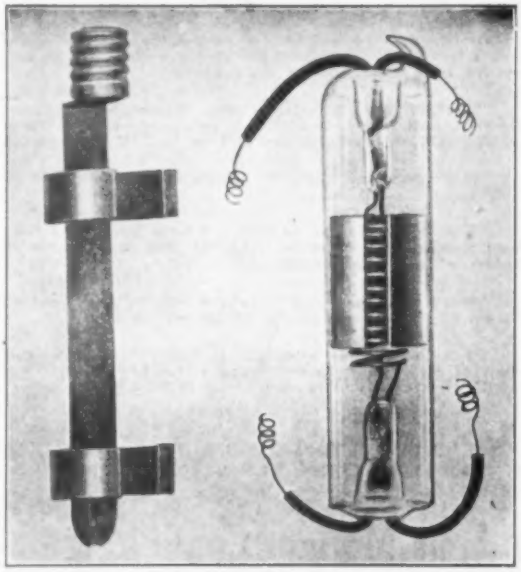
"There is only one Audion-the De Forest"

The New Type T Tubular Audion Bulb gives very loud signals from powerful stations. It has a large cylindrical plate, a spiral grid and only one filament of tungsten. As this is a long straight-line filament, it has a long life. Edison effects are completely eliminated. The plate is in contact with the heavy glass tube, preventing overheating.

Sold Separately, $5.50 each

The special adapter fits this type to the screw base receptacles of De Forest apparatus, and is furnished at 40 cents extra.

Send stamp for Bulletins D16 and B16



The Wireless Mfg. Co.
Canton, Ohio

READ THESE LETTERS!

HERE IT IS,—AND HERE IS WHAT IT DOES!

"PARAGON" RA-6 Amplifying Short Wave Receiver. Range 180 to 580 meters—Price $35.00.

"It Has Solved The Trans-Continental Relay Problem."

"Improve it, and it is useless." No Tuning Capacities, and No Switches In The Audion Circuits, No End-losses, No "Shorted" turns. Amplifications up to 100 times. Selectivity as great comparitively as the amplification. All amplifications obtained without change of spark tone. Covered by a 2-year satisfaction-or-your-money-back guarantee. FURTHERMORE, we guarantee the RA-6 to so far excel other short wave receivers that there is no comparison.

A PRODUCT MAY BE JUDGED BY ITS USERS.

"The results obtained have been almost marvelous."
(2LK) J. O. Smith, Valley Stream, L. I., N. Y.

"In a word, I think it is the greatest short wave tuner I ever saw."
(8JZ) Rev. A. J. Manning, Cleveland, Ohio.

"I take this time to congratulate you on the design of the perfect short wave receiver. I have never seen anything in its class before."
(FS) Howard L. Stanley, Babylon, L. I. N Y.

"I am delighted with the results."
(2AFT) Folger Oudin, Schenectady, N. Y.

"I like the RA-6 very much."
(1ZM) Hiram Percy Maxim, Hartford, Connecticut.

"The results obtained with it have surprised me very much. Using it I worked 2AGJ at Albany for about an hour, and not once did he fade out so I could not get him back. At times I could hear him several feet from the 'fones. Other stations hitherto just readable come in very loud.
(9IK) R. H. G. Mathews, Chicago, Ills.

"'The Set' received several days ago. I want to say it is a peach, and even surpassed my expectations. It is a wonder for selectivity, and all signals very much louder. Have heard stations that I had never heard before, and worked 1VN at noon. You may remember that Hartford has always been closed to us around here."
(2AGJ) John K. Hewitt, Jr., Albany, N. Y.

"Results entirely satisfactory. Atmospheric conditions not at all good. Notwithstanding this however, with two sets of 'fones in series, we could hear and copy many long distance stations including 5DU, 5AM, 8AEZ and 9BY as well as several others we did not mark down."
John C. Cooper, Jr., Jacksonville, Fla.

"Never dreamed that the possibilities of this type of apparatus were so great until I installed instrument."
Wm. H. Allison, Worcester, Mass.

"The finest set for amateurs I have ever tried out. Just as you represented it to me. Have been able to hear some 5s, some 4s, and any number of 1, 2, 3, 8, and 9 stations every night, no matter what the air conditions."
(2ZP) John W. Hubbard, Port Chester, N. Y.

"Have used the RA-6 for about a week with such marked results, that thought a word of appreciation at this time might be of interest to you."
(2IM) L. Spangenberg, Lakeview, N. J.

"The increase in intensity of signals received is almost beyond belief, and I have astonished many of my friends, as well as myself. The set is the most selective I have ever handled, and when familiar with it wonders may be performed."
(2ABG) C. R. Runyon, Jr., Yonkers, N. Y.

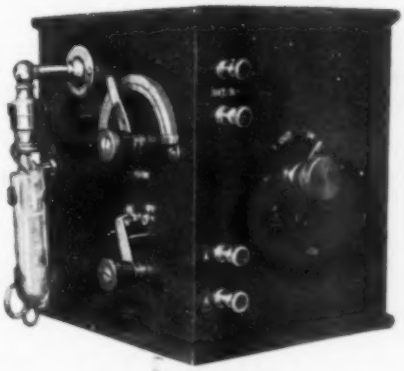
SEND STAMP TODAY FOR BULLETIN "O." IT WILL INTEREST YOU. IT DESCRIBES A VARIETY OF CORRECTLY DESIGNED APPARATUS,—APPARATUS WHICH HAS SET NEW STANDARDS.

Adams Morgan Co., 16 Alvin Place **Upper Montclair, N. J.**

"THERE IS ONLY ONE AUDION, THE DE FOREST"

DE FOREST ULTRAUDION DETECTOR

FOR DAMPED AND UNDAMPED WAVES



TYPE UJI
DeForest Ultraudion Detector
Price, $27.50

The new DeForest Ultraudion Detector enables every operator to receive both spark and arc signals at minimum expense. This instrument is made for private or amateur use only, and is within the means of all. Heretofore the lowest priced genuine Ultraudion cost $110.00.

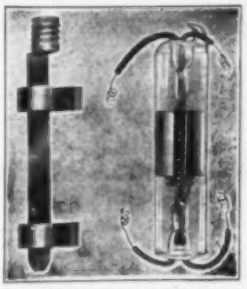
We now offer the new amateur type at $27.50. It is equipped with potentiometer control for the "B" or high voltage circuit, arranged for external batteries to be furnished by the purchaser, has an internal rheostat like our higher priced instruments, and is equipped with the genuine DeForest Tubular Audion with adapter.

No complicated circuits for tuning are necessary or desirable. Simply a regular tuner of proper size is used. No need of spending money on large, expensive coils to receive Darien, Nauen, Eilvese and all the undamped stations.

The genuine DeForest Tubular Audion illustrated herewith is now within the means of all amateur operators. It is sold to anyone in any quantity without the return of the old one.

Fully 50 percent. more sensitive than any other known form of detector and thoroughly reliable. Tests show an operating life of at least 800 burning hours when properly used, equal to at least a year's service.

With it the maximum receiving range can be covered. Suitable for receiving arc and spark signals and also for amplifying. Each equipped with a static shunt to prevent paralyzing from static and loud signals. Guaranteed to be delivered to you in perfect condition.



Genuine DeForest Tubular Audion
Price, $5.50, delivered
Adapter, 40c extra

ACCEPT NO INFRINGING IMITATIONS — INSIST ON THE GENUINE ARTICLE

Send stamp for Bulletins R16 on the Audion Detectors, Audion Receiving Sets the Tubular Audion and the Ultraudion

"WARNING—You are entitled to the genuine Audion, guaranteed by the owners of the Audion patents, when making an investment of this kind. Any evacuated detector having a filament, a grid and a plate, as well as other types, are covered by our patents, and several irresponsible infringers are being prosecuted. To be safe and get full value for your money, insist on the genuine DeForest Audion."

DeForest Radio Telephone & Telegraph Company

1391 SEDGWICK AVENUE

New York, N. Y.

Makers of the Highest Grade Receiving Equipment in the World

The New Turney Radio Receivers

MADE TO UNITED STATES NAVY SPECIFICATIONS

Note that pressure adjustment. You can wear it a week without fatigue. Lenient adjustable back support; Delux comfort, beautifully finished extremely sensitive. Order a set today. You can't be disappointed. —10 days' trial allowed.

Patent Applied For

Positively the greatest value in Head Sets ever offered.

3000 Ohms, wound with wire. Pure Bakelite ear caps, Positive friction adjustment, no screws to catch the hair. Weight only nine ounces. Six foot Silk Cord.

PRICE $7.50 **MAILING WEIGHT TWO LBS.**

SEND FIVE CENTS IN STAMPS FOR OUR NEW CATALOG IT TELLS ABOUT EVERYTHING WE MAKE.

IMMEDIATE DELIVERIES

EUGENE T. TURNEY CO., Inc.
2595 Third Ave., New York City

TURNEY QUALITY

Weaco Semi-quenched Rotary Gap

Less Condenser
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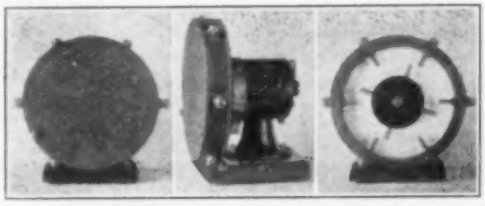

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Bakelite Construction

DO YOU WANT TO DECREASE POWER TO ELIMINATE NOISE FROM YOUR GAP? A SEMI-QUENCHED GAP UTILIZING THE VENIER PRINCIPLE, BEING USED EXCLUSIVELY BY THE NAVY IN THE CONSTRUCTION OF THEIR MOST EFFICIENT GAPS, AND APPLIED FOR THE FIRST TIME IN THE CONSTRUCTION OF AN ENTIRELY ENCLOSED GAP FOR THE AMATEUR.

YOU NEED OUR BULLETIN NO. 101. ENCLOSE 2c STAMP AND MENTION Q. S. T.

Wireless Experimental Apparatus Co.

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